Workforce, Workload, and Burnout Among Intensivists and Advanced Practice Providers: A Narrative Review

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Objectives: To assess—by literature review and expert consensus—workforce, workload, and burnout considerations among intensivists and advanced practice providers.

Design: Data were synthesized from monthly expert consensus and literature review.

Setting: Workforce and Workload section workgroup of the Academic Leaders in Critical Care Medicine Task Force.

Measurements and Main Results: Multidisciplinary care teams led by intensivists are an essential component of critical care delivery. Advanced practice providers (nurse practitioners and physician assistants) are progressively being integrated into ICU practice models. The ever-increasing number of patients with complex, life-threatening diseases, concentration of ICU beds in few centralized hospitals, expansion of specialty ICU services, and desire for 24/7 availability have contributed to growing intensivist staffing concerns. Such staffing challenges may negatively impact practitioner wellness, team perception of care quality, time available for teaching, and length of stay when the patient to intensivist ratio is greater than or equal to 15. Enhanced team communication and reduction of practice variation are important factors for improved patient outcomes. A diverse workforce adds value and enrichment to the overall work environment. Formal succession planning for ICU leaders is crucial to the success of critical care organizations. Implementation of a continuous 24/7 ICU coverage care model in high-acuity, high-volume centers should be based on patient-
centered outcomes. High levels of burnout syndrome are common among intensivists. Prospective analyses of interventions to decrease burnout within the ICU setting are limited. However, organizational interventions are felt to be more effective than those directed at individuals.

**Conclusions:** Critical care workforce and staffing models are myriad and based on several factors including local culture and resources, ICU organization, and strategies to reduce burden on the ICU provider workforce. Prospective studies to assess and avoid the burnout syndrome among intensivists and advanced practice providers are needed. (Crit Care Med 2018; XX:00–00)

**Key Words:** advanced practice providers; burnout; critical care organization; intensive care unit; intensivists; workforce; workload

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**THE MULTIPROFESSIONAL ICU TEAM**

Multidisciplinary care teams are an essential component of critical care delivery. Daily rounds including intensivists, nurses, respiratory therapists, pharmacists, and case managers are associated with lower mortality compared with services that do not participate in multidisciplinary rounds (13). The reasons for this are multifactorial, but a high functioning team, with standardized expectations and professionalism, should be the goal within the ICU. The ideal multidisciplinary approach mitigates patient care conflicts, truncates financial issues (14), and sets expectations regarding foreseeable areas of disagreement (15). Conflicts within the ICU team are important drivers for job strain and worker burnout (16).

**ISSUES AFFECTING CRITICAL CARE WORKFORCE**

In addition to the increase in case volume and severity of disease, the concentration of ICU beds in fewer centralized hospitals, expansion of specialty ICU services, and desire for 24/7 availability have contributed to growing staffing concerns. Several aspects of provider time demand, individual and aggregate patient acuity, and workflow are also contributory factors (17–19). Increased staff workload may negatively impact practitioner wellness, team perception of care quality, time available for teaching, and length of stay (LOS) when the patient to intensivist ratio is greater than or equal to 15 (17, 20). Among intensivists, workload is independently associated with intensity of burnout which in turn is strongly correlated with intention to leave one’s job (21). The choice of staffing models (Table 1) made by CCOs must ultimately be based on 1) local culture and resources, 2) evidence regarding ICU organization, and 3) strategies to reduce ICU workforce burden and to decrease burnout rate in nurses, APPs, resident physicians, critical care fellows, and intensivists.

Nursing shortages are also of great concern. By 2030, the nursing shortage in the United States could exceed 1 million (22). The nurse-to-patient ratio of 1:2 is commonly considered as a standard. Several nursing organizations are lobbying for federally mandated ratios, which have already been mandated in select states (23). This could have a staggering effect on
Evidence suggests that high-intensity ICU care is associated with decreased mortality and ICU LOS (24, 25), although this association is smaller than initially thought (26). Enhanced team communication and reduction of practice variation are important mechanisms by which outcomes are improved, independent of the composition or size of the ICU workforce (27). Additionally, there is increasing support for having specialized intensivists for a particular ICU population (28–30). However, there is no consensus on this topic, and the extent to which specialized critical care training results in improved patient outcomes is not entirely clear. Critical care specialization may be best used in tertiary referral academic centers with higher patient volume and complexity and a higher overall level of care (30).

**ALTERNATIVE STAFFING MODELS**

Multiple options exist to optimize physician staffing that prospective CCO leaders must consider, that are consistent with best practices of ICU organization. The first is reduction in demands on physicians as the only or primary ICU providers. As nighttime intensivist staffing has not been consistently associated with decreased ICU mortality (31), healthcare systems may conserve physician resources through dedicated daytime staffing in conjunction with alternative nighttime support, although other nighttime staffing workforce effects have not been adequately evaluated (32). Another strategy to reduce staffing burden is expanding the ICU workforce beyond intensivists to include APPs.

**APPs**

APPs (nurse practitioners and physician assistants) are increasingly integrated into ICU practice models (14, 15, 20, 33). APPs positively impact outcomes, LOS, implementation of guidelines, and cost control in critical care (34–36). The roles and responsibilities of APPs are multifaceted, including obtaining histories, performing physical exams, ordering and interpreting diagnostic tests, prescribing and adjusting medications, managing mechanical ventilation, performing procedures, and leading family/patient meetings (37–39). Within this broad range of responsibilities, APPs are expected to achieve competency in each task they perform and are subject to internal and external expectations and assessments of competency including ongoing professional practice evaluation within the healthcare system.

APP onboarding has evolved significantly beyond on-the-job training. Curricula for new APPs as well as formal fellowships for critical care APPs have been created, and competency-based training represents the gold-standard for APP education (40). Even with formalized programs, responsibilities of APPs vary significantly because of inconsistent scope of practice legislation among states, institutional culture, and years of experience. There is significant upfront expense related to hiring and training APPs; however, this expense is offset by revenue generated by patient care activities and savings related to improved outcomes and cost control in critical care (35, 41–43). Nevertheless, additional research is needed to measure outcomes concerning postgraduate nurse practitioner/physician assistant training (42) and tracking of defined ICU outcome measures and costs among program graduates (43).

APP provider-to-patient ratios have been reported to be in the range of 1:3 to 1:8 with a mean of 1:5 (44). When strategically planning for APPs, these ratios are dependent on factors including number of ICU consults, number of admissions and/or discharges, bed occupancy, number of residents and/or fellows, patient acuity, and time of day (35–37). In addition, the role of an APP leader who manages larger APP groups has recently been described and is recommended. The triad of a unit medical director, lead APP, and unit nursing director or leader provide a solid foundation to CCO governance as this allows issues that arise to be managed in a multidisciplinary approach (15).

**Telemedicine**

Telemedicine features remote monitoring and management of patients by intensivists, APPs, and nurses and has been shown to improve compliance with protocols and ICU best practices (45). Although data regarding outcomes are variable, outcome benefits have consistently been seen in low-intensity ICUs (46). Telemedicine has several potential support applications for ICU care including its use to leverage specialized expertise from tertiary referral centers for regional ICUs. Notably, an innovative program combining APPs and a telemedicine team designed to reach rural critical care areas has shown a reduction in ICU mortality and LOS (47).

**Other Physician Staffing Options**

Residents and fellows often play an integral role in patient care delivery in ICUs at academic medical centers. Although the care given by trainees can be outstanding, finding the balance between patient management and education in trainees can be challenging. Relatively short trainee rotations can lead to lack of understanding of an ICU’s care processes and protocols. Furthermore, although critical care fellows are committed to a
care career in critical care, majority of residents do not plan to practice in the ICU and their interest and knowledge base is variable. Furthermore, trainees need to have faculty who can be reached for advice or can return to the ICU; in some academic medical centers, intensivist attendings have a more hands-on approach.

Physicians who are board certified in fields other than critical care, including hospitalists, currently provide a significant amount of ICU services, especially in community hospitals and those outside of urban areas. Regardless of who provides care to ICU patients, competency-based training and physical presence or immediate availability should be the gold-standard for all providers.

**DIVERSITY IN THE CRITICAL CARE WORKFORCE**

A diverse workforce (age, gender, race, sexual orientation, ethnicity, socioeconomic, etc.) adds value and enrichment to the overall work environment. There is more effective collaboration and higher collective intelligence in groups that are gender diverse (48–50). Although most medical schools are approaching gender equality, survey studies report that women physicians work fewer hours over the course of their careers and spend greater number of hours on parenting and domestic activities than male physicians (50–53). In addition, insufficient time for scholarly activities coupled with the long hours and stressful ICU work environment could reduce the numbers of younger physicians who choose a career in critical care, magnifying the workforce shortage as older physicians leave the profession (11).

**SUCCESSION PLANNING**

Succession planning is a multifaceted, strategic effort on an organization’s part to ensure leadership continuity when turnover, expected or unexpected, inevitably occurs. Although most literature focuses on the corporate world, it is becoming increasingly recognized that succession planning is crucial to the success of healthcare organizations (54). However, it is estimated that only one third of healthcare organizations have any formal succession planning in place. This is especially important for critical care as many of the first generation of CCOs have had only a single leader (33). Sustainability requires careful planning for life after that leader retires. This requires a process to move beyond the personality and vision of the founding CCO leader to embrace the future. It is essential that leaders in the field develop policies and procedures around succession planning to ensure the next generation is groomed to sustain and grow existing CCOs. Failing to do so not only magnifies the problems associated with workforce shortages but can also result in disruptions in patient care and inability to sustain the mission of the CCO (11, 33).

**CRITICAL CARE WORKLOAD**

ICU workforce requirements and ICU provider workload are inextricably linked to operational variables. Traditional metrics for ICU workload include the ratio of patients per ICU attending physician; total number of ICU attending physician shifts worked per week/mo/yr; in-house attending physician ICU presence versus call from home; number of night shifts, weekend shifts, and holiday shifts worked per week/mo/yr; other attending physician non-ICU clinical responsibilities during ICU shifts; and relative value units generated. Unfortunately, existing literature offers incomplete guidance regarding the determination of optimal intensivist, nonintensivist physician, and APP workload requirements in the ICU.

Although such metrics are readily available, they do not reflect the complete workload assessment. Many unique modifiers alter these determinations, including ICU organizational structure, bed-to-bed patient acuity of illness, total (aggregate) acuity of the ICU, number of ICU provider encounters per shift, multispecialty coordination of care, institutional expectations, and others.

Furthermore, the entirety of “workload,” as it applies to critical care, has not been adequately defined or standardized. Hoonakker et al (55) summarized that “…workload consists of several components: 1) there is an operator, using his or her resources to respond to 2) external physical or cognitive demands to 3) perform a certain task”. Given these constructs, currently deployed ICU workload metrics do not incorporate all three definitional elements. The numerous existing ICU models of care also directly impact “maximum” ICU provider workload (as well as “minimum” required workforce). Unfortunately, this leads to management to espouse ephemeralization, a term coined by R. Buckminster Fuller (56), to refer to the ability “to do more and more with less and less until eventually you can do everything with nothing”. Ultimately, we estimate value (cost/quality) from these incomplete metrics and then must rationalize and explain the nonmeasured aspects of the operator-focused, optimal, critical care workload.

Further challenging the management of ICU workload is the frequent abrupt swings in patient volume and acuity seen in some ICUs. The term “strain” has been applied to the time-varying imbalance between supply of available beds, staff and other resources, and the demands to provide high-quality care (57). ICU strain correlates highly with healthcare professional stress and burnout (57).

Ideally, the implementation of a continuous 24/7 ICU coverage model particularly in high-acuity, high-volume centers should be based on patient-centered outcomes but not limited to in-hospital mortality. ICU and hospital LOS, end-of-life discussions with patients and families, crucial clinical decision-making, better educational experience for trainees, and staff satisfaction are recognized as integral to the success of 24/7 in-house intensivist and APP coverage (24, 58–64). More importantly, there are scarce data on the impact of adequate system changes for nighttime staffing models in order for the ICU team to be equally responsive as the daytime shifts. Last, workforce alternatives of in-house intensivist coverage are valid given the higher manpower requirements with high degree of workload variability for the ICU teams across ICUs. Thus, APPs, hospitalists, and electronic technologies should be considered...
as an alternate approach to a continuous patient-centered ICU model of care. The lack of incorporation of mental and physical demands, temporal demand, performance, effort, and frustration (65) into optimal ICU workload determination likely contributes to inefficient ICU practice, suboptimal quality, and provider burnout.

BURNOUT

BOS has three primary features: emotional exhaustion, depersonalization, and diminished personal accomplishment and impacts 25–51% of intensivists and 28–42% of ICU nurses (66–71). In a landmark study of attending physicians, only burnout and age greater than 55 were significant factors independently associated with intent to leave academic medicine (72). Physicians with burnout have more professional dissatisfaction and greater likelihood of reducing clinical hours and early retirement (73). From the organizational perspective, burnout has been linked to inefficiency, conflicts, absenteeism, and staff turnover. Importantly, burnout is associated with higher rates of medical errors, reduced quality of care, and lower patient satisfaction related to emotional exhaustion and depersonalization (66).

Common risk factors for burnout among ICU physicians and nurses include personal characteristics, organizational factors, quality of working relationships, and end-of-life issues (Table 2). Younger nurses have more burnout compared with older nurses who may have been self-selected as more resilient. The relationship of gender to burnout is conflicting for nurses but is an independent risk factor for burnout especially among female intensivists (21, 74). Organizational factors are a crucial target for further study and intervention. The volume and timing of clinical work, particularly number of nights and consecutive days of work, appear to be important factors influencing the likelihood of having burnout among intensivists (21, 66, 74, 75). Interestingly, in surveys of pediatric intensivists, in-house night call was not associated with increased burnout, but burnout increased as providers spent more nights per month in the hospital (74, 75).

Not surprisingly, interpersonal conflicts among critical care professionals are prominent as risk factors for burnout in numerous studies (21, 67, 70, 71). These conflicts included many combinations of strained relationships between nurses, physicians, and patients and families. In a large multinational landmark ICU study, the authors identified personal animosity, mistrust, and communication gaps as the most common interprofessional conflict-causing behaviors and targeted six independent factors including workload, ICU size, end-of-life management, symptom control, and unit-based staff meetings for future intervention (16).

Enhancing healthcare worker wellbeing and reducing burnout first require recognition of the problem and appraisal of potential drivers for dissatisfaction and burnout. Broadly, burnout drivers include loss of control of work processes, performing menial tasks, poor alignment of values with leaders, unclear or overly demanding responsibilities, and high pressure or chaotic work environment. Shanafelt and Noseworthy (78) outline organizational strategies to tackle burnout, including to acknowledge and assess the problem, develop and implement targeted unit-based interventions, cultivate community at work, align values and strengthen culture, and promote work flexibility and work-life integration, among others.

Specific interventions to prevent or to treat BOS can generally be classified as directed toward the individual or toward the organization (Table 3) (66). Research indicates that interventions implemented in a wide variety of healthcare settings are associated with modest reductions in burnout and that organizational interventions tend to be more effective than those directed at individuals (79–83). Prospective analyses of interventions within the ICU setting are limited and focus primarily on staffing strategies. Further research is needed, and the rich literature regarding risk factors and drivers for ICU burnout (Table 2) provide potential targets for intervention.

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<th>Table 2. Common Independent Risk Factors for Burnout Among ICU Nurses and Physicians</th>
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*Data derived from Moss et al (66), Poncet et al (67), Mealer et al (68), Merlani et al (69), Teixeira et al (70), Burghi et al (71).*
including novel approaches to staffing such as expanded roles for APPs and night coverage, strategies for handing ICU surge in volume and acuity, optimization of team culture, collaboration, and communication, addressing causes of moral distress, and enhancement of personal resilience and emotional intelligence. In one survey, improving upon goals of care conversations including having them earlier in the hospital course was the highest ranking strategy for reducing ICU strain and burnout (57). Special attention should be paid to the role of women intensivists since female sex is an independent risk factor for burnout in numerous studies.

**CONCLUSIONS**

We provide an overview of the issues affecting the critical care workforce, workload, and BOS among intensivists and APPs and the structure of existing CCOs related to these concerns that might help inform the design of future successful CCOs.
APPENDIX 1. ACADEMIC LEADERS IN CRITICAL CARE MEDICINE (ALCCM) TASK FORCE MEMBERS

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