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An Organizational Framework to Reduce Professional Burnout and Bring Back Joy in Practice

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Reducing professional burnout represents an important opportunity in the United States and elsewhere to create value for patients because of its deleterious effects on safety, quality, access and patient experience shortfalls.^{1,2} "Joy in Practice" is the aspirational state in which professionals are emotionally and behaviorally compassionately engaged in the care of patients and the mission of their organization. Although many of the root causes of physician burnout are societal, there are effective approaches to address the systemic drivers at the organizational, department, leader, and individual levels.^{3–7}

In this article, we present an organizational framework that leaders can deploy to reduce professional burnout and bring back Joy in Practice. To reduce professional burnout and bring back Joy in Practice, organizations need to achieve the following three primary outcomes, as shown in Figure 1:

- 1. Satisfied Human Social and Psychological Needs
- 2. Eliminated or Mitigated Structural and Functional Drivers of Burnout
- 3. Strengthened Individual Resilience

Leaders can take the following evidence-based actions to achieve those three outcomes:

- 1. Design Organizational Systems to Address Human Needs
- 2. Develop Leaders with Participative Management Competency
- 3. Build Social Community
- 4. Remove Sources of Frustration and Inefficiency
- 5. Reduce Preventable Patient Harm and Support Second Victims
- 6. Bolster Individual Wellness

Effective implementation each of these actions, we believe, will help in the realization of the three primary outcomes.^{8–10} This approach is grounded on established understandings from the fields of organizational psychology and social science, which show a direct relationship between professional engagement and clinical and organizational performance.^{11,12}

ACTIONS

We now describe the six actions in the Joy in Practice framework.

Action 1. Design Organizational Systems to Address Human Needs

Organizational leaders who are seeking to bring about Joy in Practice and reduce burnout should consider how the psychological and social needs of humans drive individual motivation. Individuals need a sense of meaning, purpose, and autonomy in their work.¹³ Consistent with this principle, the design of organizational policies, processes, and systems plays a central role in joy and burnout of staff.

The design of organizational policies, culture, systems, and decision making, and how leaders are selected, developed, and assessed, play a central role in the Joy in Practice and burnout of staff.¹³ Research in other sectors has shown that employees with less control and/or low organizational support have lower levels of well-being, satisfaction and commitment to their organization. They have higher blood pressure, turnover, and stress, as well as more burnout, back pain, clinical depression, and absenteeism. Their mortality rates are higher.^{14–17}

Optimal physician-organization partnerships are essential for physician engagement and are characterized by mutual trust, with attributes of commitment, transparency, and sincerity.

How decisions are made matters. If decisions are autocratically made and communicated, there is a missed opportunity for engagement. Interdisciplinary, constructive, collaborative, and cooperative partnerships involving frontline professionals and organization leaders mitigate burnout.^{3,18} Consensus decision making through committees or work groups can preserve a sense of choice and control for staff, as validated at our institution.¹⁹ Organizational leaders should eliminate financial incentives because they discourage collaboration within organizations and increase the risk of physician burnout.¹⁹ Also, physicians should be involved in a meaningful way in selection of their work-unit leader. Finally, term limits, with rotation of leaders, also promotes staff engagement and transparent opportunities for advancement in a leadership pipeline.¹⁹

Leadership dyads (and triads) of physicians and administrators (and nurses) can make professional leaders more effective. A system in which physician leaders are expected to continue to practice medicine may help them retain credibility with those whom they lead.¹⁹ Organizations should provide physicians some control over a portion of their practice and the infrastructure to support it.

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Figure 1: To reduce professional burnout and bring back Joy in Practice, leaders can take six evidence-based actions to achieve three primary outcomes.

What organizations measure (and pay attention to), also affects morale. If teamwork, burnout, engagement, and participative management behaviors are measured, then leaders are more likely to develop and embody these behaviors. When institutional leaders focus primarily on financial dimensions, it should be no surprise that they—and the physicians they lead—are at high risk to become misaligned with the altruistic values and mission of the medical profession.²⁰ All dimensions are important for organizational health and optimal patient care. Attention to staff engagement by leadership should be authentic and not be motivated by a goal of increased productivity. However, it should be understood that staff commitment is an important leading indicator of financial performance.^{10,19}

Most physicians are motivated by compassion and empathy for patients and a desire to relieve suffering and improve health. Empathy and compassionate care improve patient outcomes, quality of life, and patient and family experience, and physicians' compassion and empathy for patients also reduce the risk of their own burnout and improve their professional satisfaction, quality of life, and well-being.^{21–24} Studies have shown that specific training may reverse the decline in empathy.^{21–24}

Higher levels of emotional intelligence are associated with lower levels of anxiety, stress, and burnout, as well as higher levels of satisfaction.²⁵ Programs to assess and enhance emotional intelligence for all newly hired physicians can be feasible and effective.¹⁹ Physicians who have the flexibility to devote up to one fifth of their professional work effort to the activity that they find most meaningful are also at markedly lower risk for burnout.⁶ Helping physicians tailor a greater proportion of their work to that activity can be a constructive approach to align individual and organizational values and increase organizational "citizenship behavior."⁶

Excessive and unsustainable workloads are consistent drivers of physician burnout. Reduced burnout and enhanced satisfaction are strongly associated with actual reductions in professional work effort.²⁶ Institutions should offer greater flexibility to physicians in terms of when, how, and how much they work.

Action 2. Develop Leaders with Participative Management Competency

Leaders play a critical role in the professional satisfaction, well-being, and productivity of the individuals whom they lead. Participative management with collaborative action planning is a leadership style that encourages individuals to partner in analysis of problems, decision making, and implementation of solutions for issues that directly affect them.

In a study of 2,813 physicians, we analyzed data from our annual staff survey wherein staff rate their department and division chairs on leadership behaviors that promote engagement and a constructive partnership (that is, participative management). The behaviors entail asking questions, expressing appreciation, transparent communication, career

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mentorship, sharing concerns, and engaging colleagues in problem solving. Each chair receives an annual composite leadership score of up to 60 points (that is, 12 survey questions, each worth up to 5 points). For every 1-point increase in a chair's composite score, there was a 9.0% increase in staff satisfaction and a 3.3% decrease in physician burnout (p < .001).⁵ The aggregate leader score explained 47% of the variation in staff satisfaction. We conclude that frontline core unit leaders play an important role in staff satisfaction and burnout. We measure these leader behaviors in our annual all-staff survey and support leaders with opportunities for improvement. The converse is also true. Destructive, angry, and abusive leader behaviors contribute to burnout, and those behaviors must not be tolerated.^{27–29}

Leaders should work to engage physicians as respected and trusted partners and collaborators rather than employees.¹⁹ If senior leaders measure performance on the basis of only the number of relative value units generated and patient visits, then they should expect that unit leaders will, in turn, focus first on managing short-term financial issues, at the neglect of the unleashing of human potential and cultivation of engagement critical to long-term organizational health and productivity.

Action 3. Build Social Community

People have a social need for community and camaraderie. High-functioning teams are critical to delivery of highquality medical care in today's environment. Collegial and mutually respectful interactions are particularly important in medicine because of the demanding and stressful highstakes nature of the work. Leaders should be intentional in the strategies that they use to help build teams and foster community.³⁰ Interventions that promote a sense of community can improve physician well-being.³¹

Commensality—the act of sharing a meal together—is one way to foster community that has meaningful implications for teams and camaraderie.³² Combining commensality with an intentional design that encourages physicians to share meaningful and challenging aspects of their life as a professional and to support one another is an evidenced-based approach to promote engagement and reduce burnout.³³ Team-based decision making or social gatherings also nurture the growth of community while promoting social capital and cooperation.¹⁹ Strategic use of space, such as the physician lunchroom or surgical lounge, can also help cultivate community and connection.

Action 4. Remove Sources of Frustration and Inefficiency

Addressing the irritants that frustrate professional staff is critical to reduce burnout and promote Joy in Practice. Work unit leaders can facilitate team-based identification of processes, behaviors, or policies that sap Joy in Practice and contribute to burnout. The first step is to ask staff what aggravates or frustrates them (for example, "What are the pebbles in your shoe?") and what impedes their experiencing the joy that they could derive from caring for patients. Exploring such topics should lead to the identification of tangible issues that would represent opportunities to improve the work environment for physicians and, therefore, the care provided to patients. This should not be a one-time event but should be woven into the routine of the leader's interaction with his or her work unit. It is an opportunity to carefully listen to physicians' concerns and to harness their ideas and insights for process improvement. This participative management with collaborative action planning has reduced burnout and promoted engagement in our institution.¹⁰

The themes that arise in these discussions frequently center on inefficiency (for example, clerical burden, computerized order entry, physicians performing tasks that should be performed by other staff, dysfunctional processes or policies), challenges with work-life integration due to issues with scheduling and lack of flexibility (call schedules, weekend duties) and organizational programs that diminish meaning and commitment to patients (policies that are viewed as eroding quality of care or negatively affect physician-patient relationships).

Quality improvement interventions to address work conditions, processes, work flow, and communication can reduce burnout.³⁴ In one study, physician emotional exhaustion was reduced and well-being enhanced by a systematic improvement process.¹⁸ The structured approach included interventions that addressed physician control over their work environment, order in the clinical setting, and clinical meaning.^{18,35} This approach has also been validated at our institution in our previously cited study.¹⁰

In many organizations, the electronic health record (EHR) is a substantial source of inefficiency and contributing factor driver to burnout.^{26,36} Yet although the EHR is a necessary technology for safe and efficient patient care, it is important for the leaders entrusted with the responsibility of overseeing the electronic environment to have a measurable goal to reduce EHR–related clerical work for physicians. In a recent study of physicians across multiple specialties, physicians spent 27.0% of their work day on direct patient care activities and 49.2% on EHR and deskwork.³⁶ On average, physicians spent approximately two hours on clerical work for every hour spent on direct patient care tasks. Similar results were also recently reported in a study of resident physicians.³⁷

Tactics that leaders may wish to consider include the following:

- Appoint a practicing physician who is a member of the appropriate decision-making bodies, such as clinical practice and information systems committees, with the sole responsibility of streamlining and reducing clerical work. The person in that role should relentlessly focus on the following three questions:
 - 1. Must this process be performed?
 - 2. If so, can it be made more efficient? (Does it need this many "mouse clicks"?)

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- 3. Could it be executed by someone other than a physician?
- The goal of having each member of the care team practice at the top of his or her license would serve to distribute the clerical work that is truly necessary to do and is already streamlined. As each care team determines their working relationships, this should be part of the discussion.
- Consider the use of scribes as an effective and costefficient means to reduce clerical burden.³⁸
- Consider the use of computer liaisons who work directly with physicians to support their learning of optimal information systems practices, a practice that our organization has found helpful.

Even though the EHR–related clerical work and inefficiencies are a universal systems issue, there are organizational actions that can be taken to mitigate the EHR impact on human performance. EHR–related work should be guided by the principle of creating value for patients and minimizing the impact on professionals.

Opportunities to reduce frustration and help achieve Joy in Practice, some of which we have already cited, can be found at the individual, leader, department, and organizational levels, as in the following:

- Organizational: Sponsor EHR clerical work reduction task force.
- Department: Support optimal care team performance initiative.
- Leader: Ask staff, "What is the pebble in your shoe?" and help them address the irritants.
- Individual: Improve efficiency by learning best e-mail management practices.

There is a shared responsibility for identifying and addressing sources of frustration and inefficiency at each level. Leaders need to take responsibility for escalating the issues that are beyond the purview of their work unit and take ownership in addressing those that are within local control.^{10,19}

Action 5. Reduce Preventable Patient Harm and Support Second Victims

Preventable patient harm is a traumatic experience for patients and their families and friends. For most of these occurrences, there is also a second victim—the health care professional involved in the medical error, failure to rescue, misdiagnosis, or other contributing process. Professionals involved in the care of patients for whom serious harm occurred frequently have issues with depression and burnout.^{39,40}

The organization's ability to deal with preventable harm in an equitable manner that seeks to address the factors that contributed to the defective care rather than blame the individual is essential to a fair and just culture. Among the approaches that can mitigate the negative repercussions of these situations are (1) supporting the second victims' emotional and psychological needs, (2) establishing interdisciplinary teams to address root causes of patient harm events, and (3) establishing and fortify a fair and just culture. For example, an on-call institutional team can effectively provide social, psychological, and emotional support for professionals who are affected by their involvement in a patient-related adverse event.⁴¹

Leaders have an obligation to support staff after these traumatic events (as well as any colleague who is suffering from burnout and its attendant increase in suicidal ideation). Their actions should create a culture of safety that seeks to improve processes and policies rather than to assign blame for system and human factor issues. Procedures and practices that support a fair and just culture are thus an important element of fighting burnout (for example, consoling instead of punishing competent staff involved in harm events resulting from defective processes or expected human factors limitations).^{39,40,42–44} To flourish, people need to feel that they are being treated fairly by their leaders.

Organizations that establish interdisciplinary improvement teams to address root causes of harm events will see important financial returns from the time and resources invested.⁴⁵ However, the most important dividend is a safer system.^{10,30} The teamwork process involved in identifying and eradicating root causes augments camaraderie, an important resilience-enhancing human need. So the act of working together with colleagues is in itself therapeutic.^{10,30}

Action 6. Bolster Individual Wellness

Resilience is the ability to adapt to and recover from stressors. For optimal performance, both the organization and the individual must be resilient. Individual resilience is a key to the sustainability of the health care workforce. Although enhancing personal resilience is primarily the responsibility of the individual, organizations can promote it by providing access to wellness programs and encouraging staff to participate.

Wellness programs must not be a substitute for addressing and improving the organizational factors that contribute to burnout (Actions 1–5). It is not possible, however, to eradicate all the societal, professional, and organizational stressors that contribute to burnout. Therefore, physicians have a shared responsibility to build their immunity to stress and ability to tolerate uncertainty.⁴⁶

Resilience results from many individual wellness factors: social support, mindfulness, cognitive flexibility, ability to tolerate uncertainty, physical activity, adequate sleep, self-awareness, forgiveness, spirituality, and purpose.^{4,8,22,24,43,47} Exercise, for example, has been shown to positively affect mood, depression, anxiety, fatigue, work absences, and social relationships.⁴⁸ Resilience programs (which include online and face-to-face educational resources) for all the individual wellness factors clearly appear to be worthwhile.^{24,31,49–51}

CONCLUSION

We describe an organizational framework designed to reduce professional burnout and engender Joy in Practice. It is built

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on six evidence-based actions that leaders can deploy to achieve the three primary outcomes:

- 1. Satisfied Human Social and Psychological Needs
- 2. Eliminated or Mitigated Structural and Functional Drivers of Burnout
- 3. Strengthened Individual Resilience

Two recent systematic reviews indicate that organizationdirected structural and functional interventions, as well as individual-focused strategies, can result in meaningful reduction in professional burnout.^{52,53} This conclusion is consistent with our experience.¹⁰ The proposed six actions in our framework are supported by the findings, which showed value in fostering communication, instituting structural changes, cultivating teamwork, supporting stress management tactics, enhancing job control, and focusing on leadership skills.^{52,53}

Although much more research is necessary to define the optimal organizational environment, we know enough today to make substantive improvements. The predominant resource required for implementation is time and attention from leaders and staff.

Conflicts of Interest. The authors have no conflicts of interest to report.

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REFERENCES

- Linzer M, et al. Working conditions in primary care: physician reactions and care quality. Ann Intern Med. 2009 Jul 7;151:28–36, W6-9.
- Friedberg MW, et al. Factors Affecting Physician Professional Satisfaction and Their Implications for Patient Care, Health Systems, and Health Policy. Santa Monica, CA: RAND Corporation, 2013.
- 3. Sinsky CA, et al. In search of joy in practice: a report of 23 high-functioning primary care practices. Ann Fam Med. 2013;11:272–278.
- 4. Linzer M, et al. 10 bold steps to prevent burnout in general internal medicine. J Gen Intern Med. 2014;29:18–20.
- Shanafelt TD, et al. The impact of organizational leadership on physician burnout and satisfaction. Mayo Clin Proc. 2015;90:432–440.
- Shanafelt TD, et al. Career fit and burnout among academic faculty. Arch Intern Med. 2009 May 25;169:990–995.
- Linzer M, et al. Organizational climate, stress, and error in primary care: the MEMO Study. In: Henriksen K, et al., eds. Advances in Patient Safety: From Research to Implementation, Vol. 1. Research Findings. Rockville, MD: Agency for Healthcare Research and Quality, 2005. Accessed Feb 20, 2017. https://www.ncbi.nlm.nih.gov/books/NBK20448/.
- Shanafelt TD, et al. Avoiding burnout: the personal health habits and wellness practices of US surgeons. Ann Surg. 2012;255:625–633.

- Dyrbye LN, et al. Utility of a brief screening tool to identify physicians in distress. J Gen Intern Med. 2013;28:421– 427.
- Swensen S, Kabcenell A, Shanafelt T. Physician-organization collaboration reduces physician burnout and promotes engagement: the Mayo Clinic experience. J Healthc Manag. 2016;61:105–127.
- Ham C. Improving NHS Care by Engaging Staff and Devolving Decision Making: Report of the Review of Staff Engagement and Empowerment in the NHS. London: King's Fund, 2014.
- Lee K, Allen NJ. Organizational citizenship behavior and workplace deviance: the role of affect and cognitions. J Appl Psychol. 2002;87:131–142.
- 13. Deci EL. Intrinsic Motivation. New York City: Plenum Press, 1975.
- Freeborn DK. Satisfaction, commitment, and psychological well-being among HMO physicians. West J Med. 2001;174:13–18.
- Marmot MG, et al. Health inequalities among British civil servants: the Whitehall II study. Lancet. 1991 Jun 8;337:1387– 1393.
- Johnson JV, et al. Long-term psychosocial work environment and cardiovascular mortality among Swedish men. Am J Public Health. 1996;86:324–331.
- Baard PP, Deci EL, Ryan RM. Intrinsic need satisfaction: a motivational basis of performance and well-being in two work settings. J Appl Soc Psychol. 2004;34:2045– 2068.
- Dunn PM, et al. Meeting the imperative to improve physician well-being: assessment of an innovative program. J Gen Intern Med. 2007;22:1544–1552.
- Swensen S, et al. Leadership by design: intentional organization development of physician leaders. J Manage Dev. 2016;35:549–570.
- Herzer KR, Pronovost PJ. Physician motivation: listening to what pay for performance programs and quality improvement collaboratives are telling us. Jt Comm J Qual Patient Saf. 2015;41:522–528.
- Halpern J. From idealized clinical empathy to empathic communication in medical care. Med Health Care Philos. 2014;17:301–311.
- Thirioux B, Birault F, Jaafari N. Empathy is a protective factor of burnout in physicians: new neuro-phenomenological hypotheses regarding empathy and sympathy in care relationship. Front Psychol. 2016;7:763.
- Riess H, et al. Empathy training for resident physicians: a randomized controlled trial of a neuroscience-informed curriculum. J Gen Intern Med. 2012;27:1280–1286.
- Krasner MS, et al. Association of an educational program in mindful communication with burnout, empathy, and attitudes among primary care physicians. JAMA. 2009 Sep 23;302:1284–1293.
- Cazan A-M, Năstasă LE. Emotional intelligence, satisfaction with life and burnout among university students. Procedia Soc Behav Sci. 2015;180:1574–1578.
- Shanafelt TD, et al. Longitudinal study evaluating the association between physician burnout and changes in professional work effort. Mayo Clin Proc. 2016;91:422– 431.
- Breevaart K, et al. The influence of constructive and destructive leadership behaviors on follower burnout. In: Leiter MP, Bakker AB, Maslach C, eds. Burnout at Work: A Psychological Perspective. New York City: Psychology Press, 2014:102–121.

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- Aryee S, et al. Abusive supervision and contextual performance: the mediating role of emotional exhaustion and the moderating role of work unit structure. Manage Org Rev. 2008;4:393–411.
- 29. Taris TW. Is there a relationship between burnout and objective performance? A critical review of 16 studies. Work Stress. 2006;20:316–334.
- 30. Swensen SJ, et al. The Mayo Clinic value creation system. Am J Med Qual. 2012;27:58–65.
- Beckman HB, et al. The impact of a program in mindful communication on primary care physicians. Acad Med. 2012;87:815–819.
- Kniffin KM, et al. Eating together at the firehouse: how workplace commensality relates to the performance of firefighters. Hum Perform. 2015 Aug 8;28:281– 306.
- West CP, et al. Intervention to promote physician well-being, job satisfaction, and professionalism: a randomized clinical trial. JAMA Intern Med. 2014;174:527–533.
- Linzer M, et al. A cluster randomized trial of interventions to improve work conditions and clinician burnout in primary care: results from the Healthy Work Place (HWP) study. J Gen Intern Med. 2015;30:1105–1111.
- Beckley ET. Physician satisfaction tied to autonomy: what's news and what's next. Mod Phys. 2003;7(2):2.
- Sinsky C, et al. Allocation of physician time in ambulatory practice: a time and motion study in 4 specialties. Ann Intern Med. 2016 Dec 6;165:753–760.
- Wenger N, et al. Allocation of internal medicine resident time in a Swiss hospital: a time and motion study of day and evening shifts. Ann Intern Med. Epub 2017 Jan 31.
- Shultz CG, Holmstrom HL. The use of medical scribes in health care settings: a systematic review and future directions. J Am Board Fam Med. 2015;28:371–381.
- Wu AW. Medical error: the second victim. The doctor who makes the mistake needs help too. BMJ. 2000 Mar 18;320:726–727.
- Shanafelt TD, et al. Burnout and medical errors among American surgeons. Ann Surg. 2010;251:995– 1000.

- 41. Scott SD, et al. Caring for our own: deploying a systemwide second victim rapid response team. Jt Comm J Qual Patient Saf. 2010;36:233–240.
- Marx D. Patient Safety and the "Just Culture": A Primer For Health Care Executives. Medical Event Reporting System for Transfusion Medicine (MERS-TM). New York City: Columbia University, 2001.
- West CP, et al. Association of resident fatigue and distress with perceived medical errors. JAMA. 2009 Sep 23;302:1294– 1300.
- 44. Williams ES, et al. The relationship of organizational culture, stress, satisfaction, and burnout with physician-reported error and suboptimal patient care: results from the MEMO Study. Health Care Manage Rev. 2007;32:203–212.
- 45. Swensen SJ, et al. The business case for health-care quality improvement. J Patient Saf. 2013;9:44–52.
- 46. Simpkin AL, et al. Tolerating uncertainty—the next medical revolution? N Engl J Med. 2016 Nov 3;375:1713–1715.
- Ruotsalainen JH, et al. Preventing occupational stress in healthcare workers. Cochrane Database Syst Rev. 2015 Apr 7;(4):CD002892.
- Laskowski ER. Walking throughout your day keeps depression (and a host of other health problems) away. Mayo Clin Proc. 2016;91:981–983.
- Epstein RM, Krasner MS. Physician resilience: what it means, why it matters, and how to promote it. Acad Med. 2013;88:301–303.
- Sood A, et al. Stress Management and Resiliency Training (SMART) program among department of radiology faculty: a pilot randomized clinical trial. Explore (NY). 2014;10:358– 363.
- Sood A, et al. Stress management and resilience training among department of medicine faculty: a pilot randomized clinical trial. J Gen Intern Med. 2011;26:858–861.
- Panagioti M, et al. Controlled interventions to reduce burnout in physicians: a systematic review and meta-analysis. JAMA Intern Med. 2017 Feb 1;177:195–205.
- West CP, et al. Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. Lancet. 2016 Nov 5;388:2272–2281.