ORIGINAL RESEARCH

Physician and Advanced Practice Clinician Burnout in Rural and Urban Settings

Melissa L. Harry, PhD, Nancy L. Sudak, MD, Mary J. Engels, MS, PCC, CDE, Karly K. Horn, BAS, CWWPM, Kate Dean, MBA, Sara Poplau, BA, Martin J. Stillman, MD, JD, and Mark Linzer, MD

Introduction: Recruiting rural-practicing clinicians is a high priority. In this study, we explored burnout and contributing work conditions among rural, urban, and family practice physicians and advanced practice clinicians (APCs) in an Upper Midwestern health care system.

Methods: The Mini Z burnout reduction measure was administered by anonymous electronic survey in March 2022. We conducted bivariate analyses of study variables, then assessed relationships of study variables to burnout with multivariate binary logistic regression.

Results: Of 1118 clinicians (63% response rate), 589 physicians and 496 APCs were included in this study (n = 1085). Most were female (56%), physicians (54%), and White (86%), while 21% were in family practice, 46% reported burnout, and 349 practiced rurally. Rural and urban clinician burnout rates were comparable (45% vs 47%). Part-time work protected against burnout for family practice and rural clinicians, but not urban clinicians. In multivariate models for rural clinicians, stress (OR: 8.53, 95% CI: 4.09 to 17.78, *P < .001*), lack of workload control (OR: 3.06, 95% CI: 1.47-6.36, *P = .003*), busy/chaotic environments (OR: 2.53, 95% CI: 1.29-4.99, *P = .007*), and intent to leave (OR: 2.18, 95% CI: 1.06-4.45, *P = .033*) increased burnout odds. In family practice clinicians, stress (OR: 13.43 95% CI: 4.90-36.79, *P < .001*) also significantly increased burnout odds.

Conclusions: Burnout was comparable between rural and urban physicians and APCs. Part-time work was associated with decreased burnout in rural and family practice clinicians. Addressing burnout drivers (stress, workload control, chaos) may improve rural work environments, reduce turnover, and aid rural clinician recruitment. Addressing stress may be particularly impactful in family practice. (J Am Board Fam Med 2024;37:43–58.)

Keywords: Advanced Practice Clinicians, Burnout, Clinicians, Family Medicine, Health Workforce, Mini Z, Physicians, Quantitative Research, Rural Medicine, Secondary Data Analysis, Survey and Questionnaires, Urban Health Services, Work-Life Balance

Introduction

The COVID-19 pandemic drew needed attention to the issue of burnout and workplace stress among health care clinicians.[1–3] In the 11th Revision of the International Classification of Diseases (ICD-11), burnout syndrome is considered an occupational

phenomenon rather than a medical condition,[4,5] and results from unmanaged chronic workplace stress distinguished by "1) feelings of energy depletion or exhaustion; 2) increased mental distance from one's job, or feelings of negativism or cynicism related to one's job; and 3) a sense of ineffectiveness and lack of accomplishment."[5] In 2020, 49% of more than 20,000 clinicians reported burnout in the American Medical Association's Coping with COVID survey.[6] These numbers soared to more than 60% later in 2021.[7] Burnout was also associated with intent to leave health care employment during the pandemic.[8] Frontline clinicians experienced moral injury, a concept identified in combat veterans,[9] due to morally injurious encounters when clinicians were unable to cure seriously ill COVID-19 patients,[10,11] or provide care concordant with their professional values.

Burnout in health care was a major concern before SARS-CoV-2,[12–18] when burnout affected 35 to 54% of physicians and nurses in the US.[19,20] In a 2017 to 2018 survey, 43.9% of physicians affirmed having 1 symptom of burnout.[21] As summarized by West et al.,[22] burnout negatively impacts physician health, including increasing risk of suicide, particularly in general practice and internal medicine,[23] and impacts both patient care and health care systems.[13] Factors associated with burnout can be influenced by individual and organizational characteristics, showing the need for interventions at multiple levels.[24,25] Few studies have been conducted on stress and burnout among nurse practitioners (NPs) and physician assistants (PAs) together,[19] suggesting more research is needed with Advanced Practice Clinicians (APCs), a large part of the rural health care workforce.[26] A recent study showed that 38.5% of APCs reported 1 burnout symptom.[27]

Burnout in rural clinicians has been studied recently in a few settings and relatively small samples. Graduates of a South Dakota family practice residency program showed a low 25% burnout rate in rural-based family physicians versus 38% in midsize cities and 51% in metropolitan areas, highlighting favorable aspects of rural family practice, like greater workload control, community integration, and respect.[28] There were prominent gender differences with female physicians having higher burnout rates, though these rates were comparable between rural and urban sites.[28] Another survey showed a high 64% burnout rate among rural PAs, with isolation a potential contributing factor to emotional exhaustion, and a moderately strong correlation with work control as a mitigator of burnout.[29] However, the response rate was low (11%).[29] Another recent study in Northern Canada demonstrated care complexities in settings providing health services to Indigenous peoples where postcolonial structural inequities and language and cultural barriers still exist, and where significant factors associated with burnout included the electronic medical record (EMR), insufficient payments, and cross-cultural issues.[30] Short visits, administrative burden, lack of continuity, and turnover were burnout aggravators whereas relationships within the office and community were mitigators, though relationships with persons in the community (blurred boundaries) were a double-edged sword.[30] Thus, the recent literature offers data leaning toward favorable effects of rural practice, despite many challenges, and further study is justified. A gap in the literature also exists regarding whether burnout-related factors differ between rural physicians and APCs, including in family practice settings.

Study Objective and Aims

Our objective was to address identified literature gaps using secondary data from a quality improvement project that surveyed clinicians regarding worklife and burnout in a large, integrated, Upper Midwestern health care system. Survey questions used in this study included those from the validated Mini Z (Zero Burnout Program) instrument, which evaluates drivers of workplace stress, burnout, and satisfaction.[31] This study was exploratory, with an objective of developing and advancing hypotheses testable in future research.

Our primary aims were twofold: 1) explore whether burnout and contributing work conditions differed between rural and urban clinicians and between physicians and APCs; and 2) explore contributors to burnout in family practice clinicians.

Methods
Study Population
The study population included physicians and APCs (NPs, PAs, clinical nurse specialists, midwives,

Corresponding author: Melissa L. Harry, PhD, Essentia Institute of Rural Health, Essentia Health, 502 East Second Street | 6AV-2, Duluth, MN 55805 (E-mail: Melissa. Harry@EssentiaHealth.org).

certified registered nurse anesthetists) practicing in an integrated health care system serving a chiefly rural geography with mixed rural and urban populations and facilities in 3 Upper Midwestern states. The health care system's Institutional Review Board determined this secondary data analysis study to be exempt human subjects research.

Instrumentation

The survey questions and response items used in this study are shown in Appendix 1, Table A1. The Mini Z is available in multiple languages and versions and was developed from previously validated questions used in the Minimizing Error Maximizing Outcome (MEMO) study's clinician survey.[31–34] The Mini Z version 1.0 used in this study is available at: https://www.professionalworklife.com/mini-z-survey. In the Mini Z, a single burnout item was adapted from Freeman's tedium index.[35] This item was found by Rohland et al.[36] to be a suitable substitute for the gold standard for measuring burnout, the Maslach Burnout Inventory,[37] with a significant correlation (r: 0.64) with the emotional exhaustion subscale. Burnout is rated on a 5-point scale where 3 responses represent burnout.[31] Other Mini Z items include satisfaction, stress, values alignment, workload control, EMR time pressure, home EMR time, teamwork, and work atmosphere. In this study, internal consistency reliability of the Mini Z as represented by Cronbach's α was good in the full sample (0.81), rural (0.82) and urban (0.81) subgroups, and in physicians (0.81) and APCs (0.82), and acceptable in family practice clinicians (0.79).

We included 2 items on the frequency of encountering negative experiences at work due to gender or race that were adapted from prior research.[38,39] As noted by Audi et al., a single gender and race item correlated with burnout and other key burnout predictors.[39] In addition, we included an item on intent to leave work in the next 2 years used in other studies on workplace stress,[33,40,41] and in a recent study on the impact of COVID-19 on stress and work intentions among health care workers.[8] As in prior studies, responses of moderately likely, likely, or definitely were considered as intending to leave. As noted by Sinsky et al.,[8] physician intent to leave has correlated with actual departure at rates ranging from 16% to 55% in prior research.[42–44]

Data Collection

Data came from a convenience sample of clinicians that responded to the anonymous survey administered using SurveyMonkey[45] from 03/01/2022 to 03/22/2022 in a health care system quality improvement project on clinician burnout. Approximately 1772 clinicians (all doctoral-level clinicians, advanced practice NPs, and PAs practicing in the health care system at the time of the survey) were invited by e-mail, and 1118 responded (63% response rate), including 33 psychologists, chiropractors, or other unidentified clinicians not included in this study. No payments were made for participation. Several communications were sent before the survey launch. A total of 6 communications, including reminder e-mails, were sent to clinicians while the survey was open.

Dependent and Independent Variables

The primary dependent variable in this study was the dichotomized responses to the Mini Z burnout item (I am definitely burning out and have 1 or more symptoms of burnout, eg, emotional exhaustion/The symptoms of burnout that I am experiencing will not go away. I think about work frustrations a lot/I feel completely burned out. I am at the point where I may need to seek help = 1 vs I enjoy my work. I have no symptoms of burnout/I am under stress, and do not always have as much energy as I did, but I do not feel burned out = 0) (Appendix 1, Table A1). Other dichotomized variables included other core Mini Z items: high satisfaction, high values alignment, and high stress (strongly agree/agree = 1 vs neither agree nor disagree/disagree/strongly disagree = 0), poor workload control and EMR time pressure (poor/marginal = 1 vs satisfactory/good/optimal = 0), high home EMR time (excessive/moderately high = 1 vs satisfactory/modest/minimal/none = 0), teamwork (optimal/good/satisfactory = 1 vs marginal/poor = 0), and work atmosphere (hectic, chaotic/very busy = 1 vs busy, but reasonable/not too busy/calm = 0); high 2-year intent to leave work (moderate/likely/definite = 1 vs slight/none = 0); negative workplace experiences based on race or gender (frequent/fairly often = 1 vs infrequently/rarely/never = 0); clinician role (physician = 0 vs APC = 1); employment type (part-time = 0 vs full-time = 1); clinic rurality (urban = 0 vs rural = 1); and race (white = 1 vs Black, Indigenous, and people of color [BIPOC]

and multiracial = 0) (Appendix 1, Table A1). Gender was used as a 3-category variable (male = 0 vs female = 1 vs binary/transgender/other/prefer not to specify = 2) (Appendix 1, Table A1). Rurality was coded following the US Department of Veterans Affairs using respondents' facility zip code and Rural-Urban Commuting Area codes: urban = 1, rural = 2 to 10.[46–48] Fifteen respondents who reported a practice location as being too small for identification were included with rural respondents.

Data Analysis

We described the data with univariate statistics, compared rates of dichotomized study variables with Chi-Square cross tabulations (Fisher's exact tests where expected cell counts were < 5), and reported Spearman's rho correlation coefficients (r_s) for the core Mini Z items, where statistically significant r_s = 0.30–0.59 represented fair, 0.60–0.79 moderately strong, and ≥ 0.80 very strong correlations.[49] We also tested 2 multivariate, binary logistic regression models adjusted for gender and race with separate subgroups (eg, rural and urban clinicians, physicians and APCs, and family practice clinicians). These adjusted multivariate models included: 1) Mini Z items alone; and 2) Mini Z items along with other independent variables. We reported McKelvey and Zavoina's pseudo R^2, which approximates the amount of variance in the dependent variable explained by binary logistic regression models.[50] We employed listwise deletion. The lead author conducted analyses in Stata BE 17.[51] $P < .05$ was considered statistically significant.

Results

Of the 1085 physician and APC respondents, most were female (56%), physicians (54%), white (86%), and full-time employees (84%) (Table 1). The largest discipline that respondents associated with was family practice (21%). Physicians were more likely to identify as male (49%) than female (39%), whereas APCs were more likely to identify as female (76%). Thirty-two percent (n = 349) of respondents reported a primary rural practice setting. Other respondent demographics are shown in Table 1.

In testing our first aim, Table 2 presents intercorrelation matrices for the urban (lower diagonal) and rural (upper diagonal) subgroups of physicians and APCS. In the rural subgroup, most work condition items showed fair correlations with burnout (satisfaction, stress, workload control, EMR time pressure, chaotic work atmospheres, values alignment, and teamwork, P's < 0.001), demonstrating the importance of modifiable rural practice work conditions in their relationship to burnout. For rural clinicians, several work conditions (stress, workload control, EMR time pressure, teamwork, and values alignment, P's < 0.001) also had fair correlations with satisfaction, a known predictor of intent to stay. Likewise, in the urban subgroup, many work conditions exhibited fair to moderately strong correlations with burnout (satisfaction, stress, workload control, EMR time pressure, values alignment, teamwork, and chaotic work atmospheres, P's < 0.001) and fair correlations with satisfaction (stress, workload control, EMR time pressure, teamwork, and values alignment, P's < 0.001).

In further exploring if and how traditional burnout factors differed between rural and urban clinicians and physicians and APCs (Aim 1), dichotomized Mini Z item prevalence are shown in Table 3 first for the full sample, then comparing rural with urban clinicians, and finally comparing urban and rural physicians and APCs separately. Burnout was seen in 46% of the full sample, with 39% intending to leave. Burnout aggravators for the full sample included stress (60%), chaotic work atmospheres (48%), poor workload control (43%), and EMR time pressure (39%). In bivariate analyses, rural clinicians had significantly lower rates of chaotic work atmospheres than urban clinicians (41% vs 51%, P = .003). Compared with urban physicians, rural physicians had significantly lower rates of burnout (39% vs 49%, P = .035) and chaotic work atmospheres (40% vs 52%, P = .013). However, no differences were seen in burnout odds between urban and rural physicians in adjusted, multivariate models (Table 4), and no differences were found between rural and urban APCs, including in bivariate models for all variables (Table 3) or multivariate analysis exploring burnout factors (Table 4). In the final adjusted multivariate model for physicians (Table 4), high satisfaction (OR: 0.16, 95% CI: 0.08-0.32, P < .001) and negative experiences due to race (OR: 0.12, 95% CI: 0.02–0.74, P = .023) were significantly associated with deceased burnout odds, and high stress (OR: 6.36, 95% CI: 3.60–11.24, P < .001), lack of workload control (OR: 2.42, 95% CI: 1.43–4.09, P = .001), and intent to leave (OR: 2.36, 95% CI: 1.39–4.02, P = .002) with increased burnout odds. For APCs in the final adjusted model, high satisfaction

Table 1. March 2022 Anonymous Clinician Burnout Quality Improvement Survey Respondent Demographics for the Full Sample and Family Practice Clinicians by Clinician Role for the Urban and Rural Subgroups

Demographics	Full Sample (n = 1,085)					Family Practice Sample (n = 223)			
	Total (n = 1,085) n (%)	Urban Subgroup (n = 736)		Rural Subgroup (n = 349)		Urban Subgroup (n = 86)		Rural Subgroup (n = 137)	
		Physicians (n = 419) n (%)	APCs* (n = 317) n (%)	Physicians (n = 170) n (%)	APCs* (n = 179) n (%)	Physicians (n = 47) n (%)	APCs* (n = 39) n (%)	Physicians (n = 59) n (%)	APCs* (n = 78) n (%)
Gender†									
Cisgender male assigned at birth	362 (33.4)	193 (46.1)	51 (16.1)	97 (57.1)	21 (11.7)	17 (36.2)	<5	29 (49.2)	6 (7.7)
Cisgender female assigned at birth	609 (56.1)	166 (39.6)	242 (76.3)	64 (37.6)	137 (76.5)	28 (59.6)	31 (79.5)	27 (45.8)	65 (83.3)
Non-binary/Transgender/ Other/Prefer not to answer	69 (6.4)	40 (9.6)	13 (4.1)	<10	13 (7.3)	<5	<5	<5	<10
Missing	45 (4.2)	20 (4.8)	11 (3.5)	<10	8 (4.5)	<5	<5	<5	<10
Race/Ethnicity									
White	936 (86.3)	332 (79.2)	297 (93.7)	140 (82.4)	167 (93.3)	45 (95.7)	37 (94.9)	54 (91.5)	75 (96.2)
Black	9 (0.8)	<5	<5	<5	<5	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Latino/a	15 (1.4)	8 (1.9)	<5	5 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Asian	30 (2.8)	23 (5.5)	<5	5 (2.9)	<5	0 (0.0)	0 (0.0)	<5	0 (0.0)
Native Hawaiian/Other Pacific Islander	<5	<5	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
American Indian/Alaska Native	<5	0 (0.0)	0 (0.0)	<5	<5	0 (0.0)	0 (0.0)	<5	<5
Middle Eastern/North African	9 (0.8)	5 (1.2)	0 (0.0)	<5	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Other race/Multiple races/ethnicities‡	43 (4.0)	23 (5.5)	8 (2.5)	9 (5.3)	<5	<5	<5	<5	<5
Missing race/ethnicity	40 (3.7)	24 (5.7)	7 (2.2)	<5	5 (2.8)	<5	<5	<5	<5
Employment type									
Full-time	916 (84.4)	353 (84.3)	268 (84.5)	141 (82.9)	154 (86.0)	38 (80.8)	32 (82.0)	49 (83.0)	69 (88.5)
Part-time	169 (15.6)	66 (15.8)	49 (15.5)	29 (17.1)	25 (14.0)	9 (19.2)	7 (18.0)	10 (17.0)	9 (11.5)
Department									
Anesthesiology	86 (7.9)	23 (5.5)	39 (12.3)	5 (2.9)	19 (10.6)				
Cardiology	51 (4.7)	16 (3.8)	24 (7.6)	<5	7 (3.9)				
Elder Care	24 (2.2)	<10	14 (4.4)	<5	<5				
Emergency Services	69 (6.4)	30 (7.2)	<10	18 (10.6)	12 (6.7)				
Family Practice	223 (20.6)	47 (11.2)	39 (12.3)	59 (34.7)	78 (43.6)				
General Internal Medicine	31 (2.9)	10 (2.4)	<10	9 (5.3)	<5				
General Pediatrics	26 (2.4)	13 (3.1)	<10	6 (3.5)	<5				

Continued

Table 1. Continued

| Demographics | Total (n = 1,085) n (%) | Full Sample (n = 736) | | | | Family Practice Sample (n = 223) | | | |
| | | Urban Subgroup (n = 419) | | Rural Subgroup (n = 349) | | Urban Subgroup (n = 86) | | Rural Subgroup (n = 137) | |
		Physicians (n = 419) n (%)	APCs* (n = 317) n (%)	Physicians (n = 170) n (%)	APCs* (n = 179) n (%)	Physicians (n = 47) n (%)	APCs* (n = 39) n (%)	Physicians (n = 59) n (%)	APCs* (n = 78) n (%)
General Surgery	32 (3.0)	10 (2.4)	12 (3.8)	7 (4.1)	<5				
Hospitalist Services	66 (6.1)	42 (10.0)	<10	15 (8.8)	<5				
Neurology	23 (2.1)	<10	13 (4.1)	0 (0.0)	<5				
Obstetrics & Gynecology	44 (4.1)	20 (4.8)	12 (3.8)	9 (5.3)	<5				
Orthopedic Medicine/Surgery/Urgent Care	42 (3.9)	28 (6.7)	<10	<5	<5				
Urgent Care	37 (3.4)	<10	19 (6.0)	5 (2.9)	12 (6.7)				
Specialty <2% of Total Respondents	310 (28.6)	150 (35.8)	104 (32.8)	30 (17.6)	26 (14.5)				
Missing	21 (1.9)	14 (3.3)	<10	<5	<5				

Note: Some small groups were combined and counts less than 5, and in some cases less than 10, were masked to reduce the risk of re-identification. Departments may not add up to 100% due to rounding and masking.

*Certified Nurse Practitioner, Physician Assistant, Certified Registered Nurse Anesthetist, Certified Nurse Midwife, Clinical Nurse Specialist.

†While respondents could select more than one gender, none did.

‡Respondents could select more than one race/ethnicity.

Abbreviation: APC, advanced practice clinician.

Table 2. Spearman's Rho Correlation Matrices for the Mini Z 1.0 in Urban (Lower Diagonal) and Rural (Upper Diagonal) Subgroups of Physician and Advanced Practice Clinicians

Items	Burnout	Satisfaction	Stress	Control	EMR Time	Teamwork	Chaotic	Home EMR	Values
Burnout	1.000	0.589***	0.596***	0.572***	0.424***	0.350***	0.366***	0.238***	0.345***
Satisfaction	0.613***	1.000	0.433***	0.534***	0.340***	0.461***	0.284***	0.227***	0.417***
Stress	0.622***	0.381***	1.000	0.456***	0.387***	0.278***	0.244***	0.308***	0.116*
Control	0.509***	0.462***	0.469***	1.000	0.610***	0.347***	0.397***	0.221***	0.308***
EMR time	0.400***	0.345***	0.380***	0.510***	1.000	0.192***	0.378***	0.375***	0.225***
Teamwork	0.327***	0.418***	0.205***	0.313***	0.223***	1.000	0.091	0.145**	0.436***
Chaotic	0.301***	0.203***	0.330***	0.316***	0.285***	0.117**	1.000	0.105	0.123*
Home EMR	0.170***	0.158***	0.218***	0.222***	0.463***	0.193***	0.100**	1.000	0.056
Values	0.341***	0.529***	0.155***	0.281***	0.205***	0.357***	0.126***	0.042	1.000

Note: Rounded to nearest thousandth place. *P <.05. **P <.01. ***P <.001.
Abbreviation: EMR, Electronic medical record.

(OR: 0.46, 95% CI: 0.21–0.99, P = .049) and values alignment (OR: 0.48, 95% CI: 0.26–0.88, P = .018) were significantly associated with decreased burnout odds, and high stress (OR: 6.32, 95% CI: 3.63-11.02, P < .001), lack of workload control (OR: 1.98, 95% CI: 1.14-3.45, P = .015), and intent to leave (OR: 2.38, 95% CI: 1.32-4.28, P = .004) with increased burnout odds.

In the final rural clinician subgroup multivariate regression model (Table 5), which included both physician and APCs, high satisfaction (OR: 0.26, 95% CI: 0.11-0.65, P = .004), values alignment (OR: 0.42, 95% CI: 0.19–0.90, P = .026), part-time work (OR: 0.30, 95% CI: 0.11–0.81, P = .017), and being BIPOC or multiracial (OR: 0.11, 95% CI: 0.02–0.58, P = .008) were associated with lower burnout odds in rural practice, whereas high stress (OR: 8.53, 95% CI: 4.09–17.78, P < .001), lack of workload control (OR: 3.06, 95% CI: 1.47–6.36, P = .003), chaotic work atmospheres (OR: 2.53, 95% CI: 1.29–4.99, P = .007), and intent to leave (OR: 2.18, 95% CI: 1.06–4.45, P = .033) were associated with higher burnout odds. Of note, in the model including core Mini Z items adjusted for gender and race, we found that pseudo R^2 was 61%, increasing to 64% when adding several other potential burnout factors into the model. In the final urban clinician subgroup model (Table 5), high satisfaction (OR: 0.24, 95% CI: 0.13–0.44, P < .001) and negative experiences due to race (OR: 0.09, 95% CI: 0.01–0.67, P = .019) were associated with lower odds of burnout, and high stress (OR: 7.55, 95% CI: 4.60–12.41, P < .001), lack of workload control (OR: 1.81, 95% CI: 1.15–2.83, P = .010), and intent to leave (OR: 2.48, 95% CI:

1.54–3.98, P < .001) were associated with higher burnout odds. The Mini Z core items adjusted for race and gender in the urban subgroup of physicians and APCs explained 50% of burnout variance, increasing to 54% in the final model.

In the 223 family practice clinicians (Aim 2), the burnout rate was 51%. Adjusted, multivariate binary logistic regression analyses showed no significant differences in burnout based on gender, clinician role, or rurality among family practice clinicians in the final model (Table 6). However, part-time work (OR: 0.24, 95% CI: 0.07–0.81, P = .022) and high satisfaction (OR: 0.18, 95% CI: 0.05–0.62, P = .007) were significantly associated with lower burnout odds, whereas high stress was a significant burnout driver (OR: 13.43, 95% CI: 4.90–36.79, P < .001). Along with gender and race, the Mini Z core items explained 59% of burnout variance in family practice clinicians, increasing to 65% of burnout variance in the final model with additional independent variables.

Discussion

Burnout among clinicians is a complex problem where screening and intervention may allay the deleterious impacts on the health care workforce, systems, and patients. In this large sample of physicians and APCs from an integrated health care system serving a mixed rural and urban population across a primarily rural geographic area of the Upper Midwest, we found a burnout rate of 46% in surveyed clinicians, lower than national levels (>50%) in a similar time frame.[7] Burnout rates among rural clinicians were comparable to those in

Table 3. Survey Responses to Mini Z 1.0 Items, Work Intentions, and Negative Work Experiences Due to Race or Gender: Full Sample and Rural versus Urban Comparisons, Including by Clinician Type

Items	Full Sample (n = 1085)		Urban Clinicians (n = 736)		Rural Clinicians (n = 349)			Urban Physicians (n = 419)		Rural Physicians (n = 170)			Urban APCs (n = 317)		Rural APCs (n = 179)		
	n (%)	Total	n (%)	Total	n (%)	Total	P	n (%)	Total	n (%)	Total	P	n (%)	Total	n (%)	Total	P
High satisfaction*	765 (73.1)	1047	510 (72.2)	706	255 (74.8)	341	0.385	279 (70.3)	397	122 (73.1)	167	0.507	231 (74.8)	309	133 (76.4)	174	0.681
High stress*	632 (60.4)	1047	429 (60.8)	706	203 (59.5)	341	0.702	249 (62.7)	397	92 (55.1)	167	0.091	180 (58.3)	309	111 (63.8)	174	0.232
Burnout†	485 (46.3)	1047	332 (47.0)	706	153 (44.9)	341	0.512	193 (48.6)	397	65 (38.9)	167	**0.035**	139 (45.0)	309	88 (50.6)	174	0.237
Values alignment*	728 (71.4)	1020	500 (72.8)	687	228 (68.5)	333	0.153	295 (75.4)	391	117 (72.2)	162	0.428	205 (69.3)	296	111 (64.9)	171	0.334
Lack of workload control‡	438 (42.9)	1020	300 (43.7)	687	138 (41.4)	333	0.501	183 (46.8)	391	68 (42.0)	162	0.299	117 (39.5)	296	70 (40.9)	171	0.765
EMR time pressure‡	399 (39.1)	1020	270 (39.3)	687	129 (38.7)	333	0.863	162 (41.4)	391	65 (40.1)	162	0.776	108 (36.5)	296	64 (37.4)	171	0.839
High teamwork§	881 (86.4)	1020	592 (86.2)	687	289 (86.8)	333	0.788	337 (86.2)	391	145 (89.5)	162	0.289	255 (86.1)	296	144 (84.2)	171	0.567
Chaotic work atmosphere‖	487 (47.7)	1020	350 (50.9)	687	137 (41.1)	333	**0.003**	202 (51.7)	391	65 (40.1)	162	**0.013**	148 (50.0)	296	72 (42.1)	171	0.100
High home EMR¶	281 (27.5)	1020	183 (26.6)	687	98 (29.4)	333	0.349	110 (28.1)	391	55 (34.0)	162	0.174	73 (24.7)	296	43 (25.1)	171	0.907
Intent to leave practice in 2 years#	398 (39.0)	1020	263 (38.3)	687	135 (40.5)	333	0.488	152 (38.9)	391	71 (43.8)	162	0.280	111 (37.5)	296	64 (37.4)	171	0.987
Negative work experiences due to:																	
Race**	11 (1.1)	1014	8 (1.2)	682	3 (0.9)††	332	0.489	8 (2.1)	387	3 (1.9)††	162	0.584	0 (0.0)	295	0 (0.0)	170	‡‡
Gender**	69 (6.8)	1012	52 (7.6)	682	17 (5.2)	330	0.143	36 (9.3)	388	11 (6.8)	161	0.351	16 (5.4)	294	6 (3.6)	169	0.357

Note: χ^2 analyses. $P < .05$ are bolded. Percentages rounded to nearest tenth decimal place.

* Agree/Strongly Agree.

† I am definitely burning out and have one or more symptoms of burnout, e.g. emotional exhaustion/The symptoms of burnout that I'm experiencing won't go away. I think about work frustrations a lot/I feel completely burned out. I am at the point where I may need to seek help.

‡ Poor/Marginal.

§ Satisfactory/Good/Optimal.

‖ Very Busy/Hectic, Chaotic.

¶ Moderately High/Excessive.

Moderate/Likely/Definite.

** Frequently/Fairly Often.

†† Fisher's exact test.

‡‡ Not applicable.

Abbreviations: APC, Advanced Practice Clinician; EMR, Electronic medical record; Total, Total responses for the respective item for each group (excludes non-responses).

Table 4. Factors Related to Clinician Burnout: Adjusted Binary Logistic Regression Models for Physician and APC Subgroups in the Full Sample

	Physicians		APCs	
	Mini Z	Mini Z + Independent Variables	Mini Z	Mini Z + Independent Variables*
Variables	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
High satisfaction	0.16 (0.09-0.29)***	0.16 (0.08-0.32)***	0.28 (0.14-0.56)***	0.46 (0.21-0.99)*
High stress	7.11 (4.11-12.28)***	6.36 (3.60-11.24)***	6.63 (3.85-11.42)***	6.32 (3.63-11.02)***
Values aligned	0.64 (0.34-1.21)	0.65 (0.33-1.26)	0.44 (0.24-0.78)**	0.48 (0.26-0.88)*
Lack of workload control	2.68 (1.62-4.42)***	2.42 (1.43-4.09)**	2.02 (1.18-3.46)*	1.98 (1.14-3.45)*
EMR time pressure	1.42 (0.81-2.49)	1.53 (0.86-2.71)	1.35 (0.77-2.34)	1.30 (0.74-2.30)
High teamwork	0.61 (0.26-1.43)	0.66 (0.27-1.62)	1.16 (0.57-2.39)	1.18 (0.57-2.46)
Chaos in work atmosphere	1.24 (0.76-2.01)	1.12 (0.67-1.86)	1.57 (0.96-2.56)	1.54 (0.92-2.59)
High home EMR time	1.17 (0.65-2.08)	1.28 (0.71-2.33)	1.37 (0.75-2.52)	1.47 (0.79-2.74)
High intent to leave in 2 years		2.36 (1.39-4.02)**		2.38 (1.32-4.28)**
Negative work experiences:				
Gender		1.94 (0.74-5.07)		2.61 (0.62-10.96)
Race		0.12 (0.02-0.74)*		
Part-time†		0.53 (0.26-1.08)		0.53 (0.25-1.12)
Rural clinician		0.62 (0.36-1.05)		1.32 (0.79-2.21)
Gender‡				
Female	0.96 (0.59-1.58)	0.94 (0.55-1.61)	1.40 (0.71-2.78)	1.42 (0.70-2.87)
Other§	0.86 (0.31-2.35)	0.83 (0.28-2.42)	1.02 (0.24-4.39)	0.88 (0.18-4.28)
BIPOC/multiracial‖	0.57 (0.28-1.14)	0.58 (0.27-1.22)	1.10 (0.30-3.97)	1.36 (0.37-5.02)
N	517	516	446	444
Likelihood Ratio χ^2 (df)	266.84 (11)***	286.23 (16)***	199.00 (11)***	212.30 (15)***
Pearson's χ^2 Model Fit (df)	241.88 (216)	346.07 (337)	162.06 (154)	266.65 (262)
McKelvey & Zavoina's pseudo R^2	0.548	0.591	0.484	0.515

Note: Models adjusted for gender (male, female, or other/prefer not to answer) and race (white or BIPOC/multiple race/ethnicity).
***$P < .001$, **$P < .01$, *$P < .05$.
*Negative experiences at work due to race was omitted due to collinearity.
†Compared with full-time employment.
‡Compared with males.
§Includes other, prefer not to answer, binary, transgender.
‖Compared with white.
Abbreviations: APC, advanced practice clinician; BIPOC, black, Indigenous, and people of color; CI, confidence interval; df, degrees of freedom; n/a, not applicable; OR, odds ratio; EMR, Electronic medical record.

urban practice. Part-time practice was a protective factor in most models. Challenging rural work conditions associated with higher burnout odds in multivariate models included high stress, lack of workload control, and fast-paced, chaotic environments, similar to those in urban practice, confirming that addressing modifiable work conditions identifiable with the Mini Z or similar worklife measures may improve burnout. A strong link was found in adjusted models for burnout and intent to leave for all clinicians, including in rural practitioners, suggesting that the consequences of allowing burnout to remain at current levels may negatively impact the rural workforce.

The Mini Z measure had excellent performance overall, and in rural clinicians generally (α: 0.81, 61% variance in burnout explained), comparable to or better than its performance with urban clinicians in this study and in other settings.[34] Our findings on amount of burnout variance explained are among the highest documented

Table 5. Factors Related to Clinician Burnout: Adjusted Binary Logistic Regression Models for the Rural and Urban Subgroups of Physician and Advanced Practice Clinician Survey Respondents

Variables	Rural Subgroup		Urban Subgroup	
	Mini Z OR (95% CI)	Mini Z + Independent Variables OR (95% CI)	Mini Z OR (95% CI)	Mini Z + Independent Variables OR (95% CI)
High satisfaction	0.22 (0.10-0.51)***	0.26 (0.11-0.65)**	0.19 (0.11-0.34)***	0.24 (0.13-0.44)***
High stress	9.97 (4.89-20.29)***	8.53 (4.09-17.78)***	7.50 (4.63-12.13)***	7.55 (4.60-12.41)***
Values alignment	0.38 (0.18-0.80)*	0.42 (0.19-0.90)*	0.57 (0.33-0.98)*	0.63 (0.36-1.09)
Lack of workload control	3.11 (1.54-6.29)**	3.06 (1.47-6.36)**	1.97 (1.28-3.04)**	1.81 (1.15-2.83)*
EMR time pressure	1.44 (0.68-3.02)	1.45 (0.67-3.13)	1.28 (0.79-2.06)	1.29 (0.80-2.11)
High teamwork	1.64 (0.63-4.34)	1.67 (0.61-4.57)	0.69 (0.35-1.35)	0.75 (0.37-1.51)
Chaotic work atmosphere	2.45 (1.29-4.67)**	2.53 (1.29-4.99)**	1.09 (0.71-1.65)	0.98 (0.63-1.52)
High home EMR time	0.79 (0.37-1.69)	1.01 (0.45-2.27)	1.46 (0.87-2.42)	1.50 (0.89-2.52)
High intent to leave in 2 years		2.18 (1.06-4.45)*		2.48 (1.54-3.98)***
Negative work experiences:				
Gender		0.95 (0.15-5.84)		2.34 (0.97-5.64)
Race		0.25 (0.01-7.75)		0.09 (0.01-0.67)*
APC*		1.31 (0.60-2.89)		1.01 (0.63-1.62)
Part-time†		0.30 (0.11-0.81)*		0.67 (0.36-1.25)
Gender‡				
Female	1.55 (0.80-3.02)	1.81 (0.79-4.15)	1.06 (0.69-1.63)	0.97 (0.59-1.59)
Other§	1.19 (0.18-8.08)	0.81 (0.08-8.15)	0.73 (0.29-1.81)	0.72 (0.28-1.88)
BIPOC/multiracial‖	0.10 (0.02-0.46)**	0.11 (0.02-0.58)**	1.12 (0.56-2.24)	1.34 (0.63-2.86)
N	317	315	646	645
Likelihood Ratio χ^2 (df)	180.49 (11)***	190.25 (16)***	301.64 (11)***	324.51 (16)***
Pearson's χ^2 Model Fit (df)	159.94 (150)	211.44 (212)	257.63 (228)	421.65 (386)
McKelvey & Zavoina's pseudo R^2	0.609	0.643	0.502	0.537

Note: Models adjusted for gender (male, female, or other/prefer not to answer) and race (white or BIPOC/multiple race/ethnicity).
*** $P < .001$, ** $P < .01$, * $P < .05$.
*Compared with physicians.
†Compared with full-time employment.
‡Compared to males.
§Includes other, prefer not to answer, binary, transgender.
‖Compared to white.
Abbreviations: APC, advanced practice clinician; BIPOC, black, Indigenous, and people of color; CI, confidence interval; df, degrees of freedom; n/a, not applicable; OR, odds ratio; EMR, electronic medical record.

using the Mini Z (eg, vs 50% of variance explained in an earlier study).[52] Our findings may also have considerable importance for the recruitment of clinicians to rural and family practice, and for the measurement and improvement of work conditions that merit additional study (eg, workplace stress) to further improve rural and family practice clinicians' worklives.

Our findings add substantively to the existing literature on worklife in rural practice, which has suggested challenges in small group practices.[53] More favorable findings for some smaller practices in more current research suggests this might be changing.[54,55] Like some recent research,[28] we found further evidence that burnout rates may be comparable between rural-practicing physicians and their more urban contemporaries. A study in PAs has shown a higher rate of burnout (64%).[29] Similar to our findings, there was a fair correlation of burnout in the prior study of PAs with lack of control of workload (r = 0.40), further strengthening the importance of addressing this variable to improve worklife in rural practice.[29] Thus, our large and diverse study is concordant with recent findings in the literature on rural clinicians suggesting comparable, or in the case of physicians, more favorable,[29] unadjusted burnout rates and remediable predictors. This is a new and encouraging picture of rural practice.

Table 6. Factors Related to Clinician Burnout: Adjusted Binary Logistic Regression Models for Family Practice Physicians and Advanced Practice Clinicians

Variables	Mini Z OR (95% CI)	Mini Z + Independent Variables OR (95% CI)
High satisfaction	0.18 (0.06-0.52)**	0.18 (0.05-0.62)**
High stress	16.40 (6.42-41.90)***	13.43 (4.90-36.79)***
Values aligned	0.39 (0.14-1.09)	0.44 (0.15-1.31)
Lack of workload control	1.83 (0.81-4.13)	1.75 (0.73-4.20)
EMR time pressure	1.46 (0.63-3.40)	1.46 (0.60-3.56)
High teamwork	1.42 (0.51-3.94)	1.31 (0.44-3.92)
Chaos in work atmosphere	2.25 (1.06-4.78)*	2.02 (0.90-4.52)
High home EMR time	1.13 (0.46-2.77)	1.85 (0.68-5.04)
High intent to leave in 2 years		2.11 (0.84-5.30)
Negative work experiences due to gender*		0.92 (0.11-8.09)
APC[†]		2.53 (0.99-6.42)
Part-time[‡]		0.24 (0.07-0.81)*
Rural clinician		0.60 (0.27-1.36)
Gender[§]		
Female	0.65 (0.25-1.69)	0.55 (0.17-1.72)
Other[‖]	1.36 (0.15-12.62)	0.52 (0.04-6.51)
BIPOC/multiracial[¶]	0.16 (0.03-1.02)	0.22 (0.03-1.74)
N	212	209
Likelihood Ratio χ^2 (df)	113.68 (11)***	123.93 (16)***
Pearson's χ^2 Model Fit (df)	100.84 (103)	150.47 (164)
McKelvey & Zavoina's pseudo R^2	0.586	0.645

Note: Models adjusted for gender (male, female, or other/prefer not to answer) and race (white or BIPOC/multiple race/ethnicity).
***P < .001, **P < .01, *P < .05.
*Negative experiences at work due to race was omitted due to collinearity.
[†]Compared to physicians.
[‡]Compared to full-time employment.
[§]Compared to males.
[‖]Includes other, prefer not to answer, binary, transgender.
[¶]Compared to white.
Abbreviations: APC, advanced practice clinician; BIPOC, black, Indigenous, and people of color; CI, confidence interval; df, degrees of freedom; n/a, not applicable; OR, odds ratio; EMR, electronic medical record.

Burnout was moderately high at 46% in study respondents, though it was favorable in comparison to findings from December 2021 noted in a recent national study.[7] Fair to moderately strong correlates of burnout in both the urban and rural subgroups included remediable worklife factors such as stress, workload control, values alignment, and chaotic workplaces. The meaningful correlation of burnout and workload control confirms and strengthens the finding in the study by Benson et al.[29] Many of these factors (eg, workload control and values alignment) were also associated with job satisfaction, typically a strong predictor of intent to stay.[56] These findings point the compass of where one might focus efforts to improve worklife in rural practice: control of one's schedule; support for documentation (eg, remote or on-site scribes); sufficient clinical staffing; and aligning values to maintain a focus on the mission of rural practice.

Limitations

This study is limited in that the survey data came from clinicians at a single health care system that was collected as part of a quality improvement project. Although the survey was anonymous, practice location was not, which allowed for determining level of rurality based on respondents' primary practice location. However, due to space constraints and relatively small samples in numerous specialties, we were not able to assess burnout correlates for all practice types. In addition, the impact of race and negative experiences at work due to race on burnout were tested in small samples; thus, these

findings should be viewed with caution. Of note, listwise deletion was employed due to some data being not missing at random. Finally, although the overall sample size was large, only 349 clinicians in the survey reported practicing in a rural setting and only 223 worked in family practice. However, the rural sample was still a fair amount higher than another recent study of rural clinicians.[28] Further research is needed with larger samples of rural and family practice clinicians, including from other geographic areas.

Conclusions

In this multi-state, Upper Midwestern, integrated health care system with a considerable number of clinicians practicing in rural settings and a high response rate to a quality improvement survey, burnout among rural clinicians was comparable to those practicing in urban settings. Although initiatives to decrease burnout among all clinicians must continue, our findings seem to refute the notion that practicing in a rural setting might lead to increased burnout compared with those in an urban setting. The Mini Z measure performed well in rural clinicians and can be considered an acceptable, brief, and meaningful adjunct to assess worklife and burnout in rural practice. Further studies should expand this work and confirm remediable contributors to enhancing worklife in rural settings, while confirming or denying the comparable burnout rates for rural and urban clinicians reported in this study. Part-time work continues to be associated with decreased burnout in family practice and rural, but not urban clinicians, which supports further attention and study.

To see this article online, please go to: http://jabfm.org/content/ 37/1/43.full.

References

1. Amanullah S, Ramesh Shankar R. The impact of COVID-19 on physician burnout globally: a review. Healthcare (Basel) 2020;8:421.
2. Office of the Surgeon General. *Addressing health worker burnout: the U.S. Surgeon General's advisory on building a thriving health workforce.* 2022. Available at: https://www.hhs.gov/sites/default/files/health-worker-wellbeing-advisory.pdf.
3. Sharifi M, Asadi-Pooya A, Mousavi-Roknabadi R. Burnout among healthcare providers of COVID-19; a systematic review of epidemiology and recommendations. Arch Acad Emerg Med 2021;9:e7e7.
4. World Health Organization. Burn-out an "occupational phenomenon": International Classification of Diseases. Updated 28 May 2019. Accessed August 5, 2023. Available at: https://www.who.int/news/item/ 28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases.
5. World Health Organization (WHO). International classification of diseases, eleventh revision (ICD-11). Updated Jan 2023. Accessed August 5, 2023. Available at: https://icd.who.int/browse11.
6. Prasad K, McLoughlin C, Stillman M, et al. Prevalence and correlates of stress and burnout among U.S. healthcare workers during the COVID-19 pandemic: A national cross-sectional survey study. EClinicalMedicine 2021;35:100879.
7. Linzer M, Jin J, Shah P, et al. Trends in clinician burnout with associated mitigating and aggravating factors during the COVID-19 pandemic. JAMA Health Forum 2022;3:e224163.
8. Sinsky C, Brown R, Stillman M, Linzer M. COVID-related stress and work intentions in a sample of US health care workers. Mayo Clin Proc Innov Qual Outcomes 2021;5:1165–73.
9. Litz B, Stein N, Delaney E, et al. Moral injury and moral repair in war veterans: a preliminary model and intervention strategy. Clin Psychol Rev 2009;29:695–706.
10. Amsalem D, Lazarov A, Markowitz J, et al. Psychiatric symptoms and moral injury among US healthcare workers in the COVID-19 era. BMC Psychiatry 2021;21:546.
11. Song Y, Mantri S, Lawson J, Berger E, Koenig H. Morally injurious experiences and emotions of health care professionals during the COVID-19 pandemic before vaccine availability. JAMA Netw Open 2021;4:e2136150.
12. Bridgeman P, Bridgeman M, Barone J. Burnout syndrome among healthcare professionals. Am J Health Syst Pharm 2018;75:147–52.
13. Dyrbye L, Shanafelt T, Sinsky C, Mayo Clinic, et al. Burnout among health care professionals: a call to explore and address this underrecognized threat to safe, high quality care. NAM Perspectives Discussion Paper 2017;7.
14. Lacy B, Chan J. Physician burnout: the hidden health care crisis. Clin Gastroenterol Hepatol 2018;16:311–7.
15. Patel R, Bachu R, Adikey A, Malik M, Shah M. Factors related to physician burnout and its consequences: a review. Behav Sci (Basel) 2018;8:98.
16. Romani M, Ashkar K. Burnout among physicians. Libyan J Med 2014;9:23556.
17. Shanafelt T, Noseworthy J. Executive leadership and physician well-being: nine organizational strategies to

promote engagement and reduce burnout. Mayo Clin Proc 2017;92:129–46.

18. Woo T, Ho R, Tang A, Tam W. Global prevalence of burnout symptoms among nurses: a systematic review and meta-analysis. J Psychiatr Res 2020;123:9–20.

19. National Academies of Sciences E, and Medicine, Committee on Systems Approaches to Improve Patient Care by Supporting Clinician Well-Being. *Taking action against clinician burnout: a systems approach to professional well-being*. 2019. Available at: https://nap.nationalacademies.org/catalog/25521/taking-action-against-clinician-burnout-a-systems-approach-to-professional.

20. Shanafelt T, West C, Dyrbye L, et al. Changes in burnout and satisfaction with work-life integration in physicians during the first 2 years of the COVID-19 pandemic. Mayo Clin Proc 2022;97:2248–58.

21. Shanafelt T, West C, Sinsky C, et al. Changes in burnout and satisfaction with work-life integration in physicians and the general US working population between 2011 and 2017. Mayo Clin Proc 2019;94:1681–94.

22. West C, Dyrbye L, Shanafelt T. Physician burnout: contributors, consequences and solutions. J Intern Med 2018;283:516–29.

23. Dutheil F, Aubert C, Pereira B, et al. Suicide among physicians and health-care workers: a systematic review and meta-analysis. PLoS One 2019;14:e0226361.

24. Sibeoni J, Bellon-Champel L, Mousty A, Manolios E, Verneuil L, Revah-Levy A. Physicians' perspectives about burnout: a systematic review and meta-synthesis. J Gen Intern Med 2019;34:1578–90.

25. Center C, Davis M, Detre T, et al. Confronting depression and suicide in physicians: a consensus statement. JAMA 2003;289:3161–6.

26. Hoff T, Carabetta S, Collinson G. Satisfaction, burnout, and turnover among nurse practitioners and physician assistants: a review of the empirical literature. Med Care Res Rev 2019;76:3–31.

27. Dyrbye L, Johnson P, Johnson L, et al. Efficacy of the Well-Being Index to identify distress and stratify well-being in nurse practitioners and physician assistants. J Am Assoc Nurse Pract 2019;31:403–12.

28. Hogue A, Huntington M. Family physician burnout rates in rural versus metropolitan areas: a pilot study. S D Med 2019;72:306–8.

29. Benson M, Peterson T, Salazar L, et al. Burnout in rural physician assistants: an initial study. J Physician Assist Educ 2016;27:81–3.

30. Hansen N, Jensen K, MacNiven I, Pollock N, D'Hont T, Chatwood S. Exploring the impact of rural health system factors on physician burnout: a mixed-methods study in Northern Canada. BMC Health Serv Res 2021;21:869.

31. Linzer M, McLoughlin C, Poplau S, Goelz E, Brown R, Sinsky C, AMA-Hennepin Health System (HHS) burnout reduction writing team. The Mini Z worklife and burnout reduction instrument: Psychometrics and clinical implications. J Gen Intern Med 2022;37:2876–8.

32. Linzer M, Manwell LB, Williams ES, MEMO (Minimizing Error, Maximizing Outcome) Investigators, et al. Working conditions in primary care: physician reactions and care quality. Ann Intern Med 2009;151:28–36., w6-9.

33. Linzer M, Poplau S, Grossman E, 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;30:1105–11.

34. Linzer M, Poplau S, Babbott S, et al. Worklife and wellness in academic general internal medicine: results from a national survey. J Gen Intern Med 2016;31:1004–10.

35. Schmoldt R, Freeborn D, Klevit H. Physician burnout: recommendations for HMO managers. HMO Pract 1994;8:58–63.

36. Rohland B, Kruse G, Rohrer J. Validation of a single-item measure of burnout against the Maslach Burnout Inventory among physicians. Stress and Health: Journal of the International Society for the Investigation of Stress 2004;20:75–9.

37. Maslach C, Jackson S, Leiter M. *Maslach Burnout Inventory Manual* 3rd ed. Consulting Psychologists Press; 1996.

38. Funk C, Parker K. *Women and men in STEM often at odds over workplace equity*. 2018. Available at: https://www.pewresearch.org/social-trends/wp-content/uploads/sites/3/2018/01/PS_2018.01.09_STEM_FINAL.pdf.

39. Audi C, Poplau S, Freese R, Heegaard W, Linzer M, Goelz E. Negative experiences due to gender and/or race: a component of burnout in women providers within a safety-net hospital. J Gen Intern Med 2021;36:840–2.

40. Williams E, Konrad T, Linzer M, et al. Refining the measurement of physician job satisfaction: results from the Physician Worklife Survey. SGIM Career Satisfaction Study Group. Society of General Internal Medicine. Med Care 1999;37:1140–54.

41. Babbott S, Manwell L, Brown R, et al. Electronic medical records and physician stress in primary care: results from the MEMO Study. J Am Med Inform Assoc 2014;21:e100-106–e106.

42. Buchbinder S, Wilson M, Melick C, Powe N. Primary care physician job satisfaction and turnover. Am J Manag Care 2001;7:701–13.

43. Hann M, Reeves D, Sibbald B. Relationships between job satisfaction, intentions to leave family practice and actually leaving among family physicians in England. Eur J Public Health 2011;21:499–503.

44. Rittenhouse D, Mertz E, Keane D, Grumbach K. No exit: an evaluation of measures of physician attrition. Health Serv Res 2004;39:1571–88.

45. *SurveyMonkey*. SurveyMonkey Inc.; 1999-2023. Available at: http://www.surveymonkey.com.

46. United States Department of Agriculture. Rural-Urban Commuting Area Codes. Updated Aug 17, 2020. Accessed June 16, 2022. Available at: https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/.

47. Aboumrad M, Peritz D, Friedman S, Zwain G, Watts BV, Taub C. Rural-urban trends in health care utilization, treatment, and mortality among US veterans with congestive heart failure: a retrospective cohort study. J Rural Health 2023;39:844–52.

48. U.S. Department of Veterans Affairs, Office of Rural Health. Rural veterans. Updated March 31. Accessed May 2, 2023. Available at: https://www.ruralhealth.va.gov/aboutus/ruralvets.asp.

49. Chan YH. Biostatistics 104: correlational analysis. Singapore Med J 2003;44:614–9.

50. McKelvey R, Zavoina W. A statistical model for the analysis of ordinal level dependent variables. J Math Sociol 1975;4:103–20.

51. *Stata BE Statistical Software: Release 17*. StataCorp, LLC; 1985–2021.

52. Linzer M, Visser M, Oort F, Smets E, McMurray J, de Haes H, Society of General Internal Medicine (SGIM) Career Satisfaction Study Group (CSSG). Predicting and preventing physician burnout: results from the United States and the Netherlands. Am J Med 2001;111:170–5.

53. Linzer M, Konrad T, Douglas J, et al. Managed care, time pressure, and physician job satisfaction: results from the physician worklife study. J Gen Intern Med 2000;15:441–50.

54. Edwards S, Marino M, Balasubramanian B, et al. Burnout among physicians, advanced practice clinicians and staff in smaller primary care practices. J Gen Intern Med 2018;33:2138–46.

55. Edwards S, Marino M, Solberg L, et al. Cultural and structural features of zero-burnout primary care practices. Health Aff (Millwood) 2021;40:928–36.

56. Bogaert K, Leider J, Castrucci B, Sellers K, Whang C. Considering leaving, but deciding to stay: a longitudinal analysis of intent to leave in public health. J Public Health Manag Pract 2019;25 Suppl 2, Public Health Workforce Interests and Needs Survey 2017: S78–S86.

Appendix

Table A1. Quality Improvement Survey Questions and Response Options Used in This Study

Survey Questions	Response Options
Please tell us with which gender you identify, optional (select all that apply)	Cisgender Male (assigned male at birth) Cisgender Female (assigned female at birth) Non-binary Transgender Other/Prefer not to answer
Are you a (select only one)…	Physician Psychologist Chiropractor Certified Nurse Practitioner Physician Assistant Certified Registered Nurse Anesthetist Certified Nurse Midwife Clinical Nurse Specialist Other Clinician
Please describe your race/ethnicity, optional (select all that apply)	White Black or African American Latino/a Asian Native Hawaiian or Other Pacific Islander Native American or Alaska Native Middle Eastern or North African Other
Using your own definition, are you full time or part time?	Full time Part time
In which clinical site do you practice most?	[healthcare system facilities by market]

Mini Z 1.0 Items

The Mini Z was developed by Dr. Mark Linzer and team at Hennepin Healthcare, Minneapolis MN. The Mini Z survey tools can be used for research, program evaluation and education capacities without restriction. Permission for commercial or revenue-generating applications of the Mini Z must be obtained from Mark Linzer, MD or the Hennepin Healthcare Institute for Professional Worklife before *use:* Available at: www.professionalworklife.com. *Questions drawn mainly from the Physician Worklife Study, MEMO study, and the Healthy Workplace study.*

Overall I am satisfied with my job*	**Strongly agree = 1** **Agree = 1** Neither agree nor disagree = 0 Disagree = 0 Disagree strongly = 0
I feel a great deal of stress because of my job	**Strongly agree = 1** **Agree = 1** Neither agree nor disagree = 0 Disagree = 0 Disagree strongly = 0
Using your own definition of "burnout," please select one of the answers below	I enjoy my work. I have no symptoms of burnout. = 0 I am under stress, and don't always have as much energy as I did, but I don't feel burned out. = 0 **I am definitely burning out and have one or more symptoms of burnout, e.g. emotional exhaustion. = 1** **The symptoms of burnout that I'm experiencing won't go away. I think about work frustrations a lot. = 1** **I feel completely burned out. I am at the point where I may need to seek help. = 1**
My control over my workload is	**Poor = 1** **Marginal = 1** Satisfactory = 0 Good = 0 Optimal = 0
My sufficiency of time for documentation is	**Poor = 1** **Marginal = 1** Satisfactory = 0 Good = 0 Optimal = 0

Continued

Table A1. Continued

Survey Questions	Response Options
Which number best describes the atmosphere in your primary work area?	Calm = 0 Not too busy = 0 Busy, but reasonable = 0 **Very busy = 1** **Hectic, chaotic = 1**
My professional values are well aligned with those of my department leader / immediate supervisor*	**Strongly agree = 1** **Agree = 1** Neither agree nor disagree = 0 Disagree = 0 Disagree strongly = 0
The degree to which my patient care team works efficiently together is*	Poor = 0 Marginal = 0 **Satisfactory = 1** **Good = 1** **Optimal = 1**
The amount of time I spend on the electronic medical record (EMR) at home is	**Excessive = 1** **Moderately high = 1** Satisfactory = 0 Modest = 0 Minimal/none = 0
What is the likelihood that you will leave your current practice within TWO YEARS?	None = 0 Slight = 0 **Moderate = 1** **Likely = 1** **Definite = 1**
How often do you encounter negative experiences at work due to your **gender** (e.g. being denied work opportunities, being isolated or treated as if you were not competent, experiencing repeated, small slights at work, or other forms of discrimination)?	**Frequently = 1** **Fairly Often = 1** Infrequently = 0 Rarely = 0 Never = 0
How often do you encounter negative experiences at work due to your **race** (e.g. being denied work opportunities, being isolated or treated as if you were not competent, experiencing repeated, small slights at work, or other forms of discrimination)?	**Frequently = 1** **Fairly Often = 1** Infrequently = 0 Rarely = 0 Never = 0

Note: Bolded versus non-bolded response options indicate responses that were combined to create binary variables, denoted "1" or "0."
*Reverse coded.