Evidence-Based Interventions for Medical Student, Trainee and Practicing Physician Wellbeing: A CHARM Annotated Bibliography

For the Collaborative for Healing and Renewal in Medicine (CHARM) ***Best Practices Subgroup***

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ORGANIZATION TRANSFORMATION

Program-Level Interventions

Medical Students

Agarwal G and Lake M. Personal transition to the profession: a novel longitudinal professional development and wellness medical student curriculum. *Acad Psychiatry* 2016;40:105–108.
doi: 10.1007/s40596-015-0463-1.

Impetus: Medical student wellness may be able to be specifically taught through thoughtful curriculum design and implementation.

Description: The authors describe a new 4-year professional development and wellness curriculum at Northwestern University's Feinberg School of Medicine, consisting of 17 required monthly 90-minute sessions in small groups of eight students and one faculty member from within the students' college (four colleges each have 40 students). Students prepare for each session by reviewing a learning guide and completing written exercises on a blog to stimulate reflection and narrative, then meet in small groups to process the exercise. Topics cover personal and educational goals and relationships with peers, positive psychology techniques, psychological struggles common in the profession of medicine such as perfectionism and impostor syndrome, and professional identity formation. Quantitative evaluations in the first two years included satisfaction measures by small group leaders and students (N=140). The majority of students felt more prepared to transition to medical school and more self-aware, and reported being willing to seek help if they need it. Some students were not comfortable discussing personal topics in small groups, and the facilitation of the faculty leader impacted group dynamics. The authors comment that an unintended effect of exposure to psychiatry faculty may have been to decrease stigma in seeking mental health care. There was no comparison group.

Contribution: This study is limited by its lack of measurement of validated wellbeing metrics and lack of a comparison group. The strengths of this study include its high satisfaction measures and the in depth topical curriculum that is described.

Cost: Unknown: the study did not report on costs directly, but direct and indirect costs would include preparation for monthly meetings, writing blogs, and participating in the one hour monthly meetings for all students and 20 faculty annually.

Pojednic R and Frates E. A parallel curriculum in lifestyle medicine. *Clin Teach* 2015;12:1–5.
doi: 10.1111/tct.12475.

Impetus: One potential reason why fewer than half of primary care doctors counsel their patients on lifestyle behaviors is the lack of structured training in medical school on lifestyle medicine.

Description: In 2009 Harvard Medical School developed a voluntary medical student lecture series on lifestyle medicine through the Lifestyle Medicine Interest Group. The curriculum is led by student with a faculty advisor and began as a Lunch and Learn format with 4-5 lectures (4-8 curricular hours) each year. Topics initially included an EBM approach to exercise, nutrition, behavior change, and evolved to incorporate motivational interviewing, positive psychology, and physician self-care skills. Lectures

included active participation in the activity being learned; for example, cooking demonstrations and exercises during the sessions. During the first year, 26 students participated; by 2013, 35 students participated annually. Survey data from 2013 (N=12, 35% response rate) revealed low baseline self-rated confidence in counseling patients for behavior change; the follow-up survey did not measure skills acquisition but qualitative comments suggested improved confidence. No evaluation data are provided regarding impact of physician self-care skills.

Contribution: Although this program has limited evaluation data, it provides a description of learning objectives for a curriculum to meet physician competencies in lifestyle medicine, and includes a model for implementation. The intervention included physician self-care skills in the lecture series, but no evaluation data were provided for this aspect of the intervention.

Cost: Author E. Frates indicated that faculty time was the greatest cost (personal communication).

Slavin SJ, Schindler DL, Chibnall JT. Medical student mental health 3.0: Improving student wellness through curricular changes. *Acad Med* 2014;89:573-77. doi: 10.1097/ACM.0000000000000166.

Impetus: Although several studies have described reactive or supplemental approaches to medical student mental health, few studies have assessed curricular changes to prevent the negative psychological and emotional effects of medical school. In this article, the authors describe a program to address root causes of stress to improve mental health in medical students that was implemented at Saint Louis University School of Medicine starting in 2009–2010.

Description: Curricular changes were first instituted in the 2009-2010 school year, using person-in-context primary prevention model to proactively target contextual elements within the curriculum that could contribute to poor mental health. Changes were made based on data from 2008 indicating that 57% of students had moderate-high anxiety and 27% had moderate-severe depression; volume and level of detail of material and competition were identified as drivers and were the impetus for changes. Curricular changes included: (1) a pass/fail grading system for preclinical courses, replacing the honors/near honors/pass/fail grading system; (2) a reduction in contact hours across the first two years of curriculum by 10% and reducing unnecessary detail in courses through course-specific faculty development; (3) the institution of longitudinal electives to allow students more time to explore their interests, create mentorship relationships, and to engage in service and/or research with more continuity; and (4) the establishment of learning communities composed of students and faculty who share common interests and passions beyond the classroom. In 2010-2011, a six-hour Resilience and Mindfulness program based in positive psychology was added to the first year clinical skills course. In 2011-12 anatomy was rescheduled to later in the year and exam design was changed. Students took an annual Center for Epidemiological Studies Depression Scale, Spielberger State-Trait Anxiety Inventory, Perceived Stress Scale, and Perceived Cohesion Scale. Post-change classes, compared to the historical cohort of pre-change classes, exhibited lower rates of moderate to severe depression symptoms and a substantial decrease in mean anxiety scores, as well as a non-statistically significant decrease in the mean stress levels. Mean group cohesion and student satisfaction with the program scores were higher in the post-intervention cohorts. USMLE Step 1 scores also rose significantly for the class of 2014, compared with the previous classes that did not receive the Resilience/ Mindfulness program, social events, and the reversal of anatomy and cell biology.

Contribution: This study describes a series of major curricular changes to address curricular structures that may contribute to anxiety and depression in medical students. Although the design was not randomized, the evaluation strategy used validated measurement scales and compared the intervention group to a historical cohort. Although curricular changes may be time-intensive to implement initially, this study suggests that such initiatives may have a significant effect on medical student mental health.

Cost: The authors report that the program's annual budget is less than $10,000.

Reed DA, Shanafelt TD, Satele DW, *et al.* Relationship of pass/fail grading and curriculum structure with wellbeing among preclinical medical students: A multi-institutional study. *Acad Med* 2011;86:1367-73. doi: 10.1097/ACM.0b013e3182305d81.

Impetus: Student wellbeing may be affected by curriculum structure and grading scales. This study examines whether there is an association between curriculum structure, assessment strategy, and student wellbeing.

Description: The authors surveyed 2,056 first- and second-year medical students at seven U.S. medical schools in 2007. They used the Perceived Stress Scale, Maslach Burnout Inventory, and Medical Outcomes Study Short Form (SF-8) and contacted the Dean's offices for each school to obtain hours spent in didactic, clinical, and testing experiences, and grading scales, categorized as two categories (pass/fail) versus three or more categories (e.g., honors/pass/fail). 58% (1,192) of 2,056 students responded. Students in schools using grading scales with three or more categories had higher levels of stress, emotional exhaustion, and depersonalization, were more likely to have burnout and more likely to have considered dropping out of school compared with students in schools using pass/fail systems. There was a statistically significant association between time spent in testing and perceived stress and low QOL. There was no association between contact hours in didactic and clinical experiences and wellbeing.

Contribution: This cross-sectional study showed that the grading scale was more strongly correlated with student wellbeing than any other aspects of the curriculum structure. Although it does not measure data from before and after implementing changes to pass-fail grading policies, this study implies that curriculum reforms aimed at promoting wellbeing should include attention to grading strategies.

Cost: Unknown.

Drolet BC and Rodgers S. A comprehensive medical student wellness program- Design and implementation at Vanderbilt School of Medicine. *Acad Med* 2010;85:103-10. doi: 10.1097/ACM.0b013e3181c46963.

Impetus: Research suggests that student burnout and mental illness are increasing in U.S medical schools. In response, students and administrators developed the Vanderbilt Medical Student (VMS) Wellness Program to promote student health and wellbeing through coordination of many new and existing resources.

Description: The VMS Wellness Program began in the fall of 2005 through the creation of a Student Wellness Committee (SWC) to address student leadership around the six pillars of wellness from the National Wellness Institute: intellectual, environmental, physical, interpersonal, emotional, and spiritual.

Students and the Dean of Student Affairs identified general stress points in medical students' lives, focusing on three core principles: mentoring and advising, student leadership, and personal growth. From these core principles, three components of the program emerged: the Advisory College consisting of faculty advisors with protected time, the SWC, and VMS LIVE, a longitudinal workshop-based curriculum to address personal growth and professional identity with specific goals for each year of training. They also organized an annual "Olympic-style" College Cup including both athletic and non-athletic competition which was positively received by students as an outlet for non-medical activities and forming connections with fellow students and faculty.

Contribution: The VMS Wellness Program is the first published model of a comprehensive medical student wellness initiative. The development and design of the program described in this article may serve as a framework for other institutions. Anecdotal evidence suggests that the program is well-received by Vanderbilt's medical students; however, evaluation data is not provided in this description.

Cost: Unknown.

Curriculum handbook for VMS Wellness Program: Zackoff M, Sastre E, Rodgers S. Vanderbilt wellness program: model and implementation guide. MedEdPORTAL Publications. 2012;8:9111. **http://doi.org/10.15766/mep_2374-8265.9111.**

Hassed C, de Lisle S, Sullivan G, Pier C. Enhancing the health of medical students: outcomes of an integrated mindfulness and lifestyle program. ***Adv Health Sci Educ Theory Pract*** **2009;14:387-98. http://dx.doi.org.ucsf.idm.oclc.org/10.1007/s10459-008-9125-3.**

Impetus: Poor mental health during medical training has been linked to poor personal health behaviors and burnout later in professional careers, as well as lower quality of care indicators, such as prescribing errors. This article explores a wellness curriculum at a medical school aimed at reducing burnout and increasing emotional intelligence through mindfulness-based self-care.

Description: Monash University in Australia developed its Health Enhancement Program (HEP) for their first year medical students in 2002, implemented during the second half of the first semester for the 315 medical students in each class. The curriculum includes mindfulness and mind-body techniques and the "ESSENCE" model for a healthy lifestyle (including of education, stress management, spirituality, exercise, nutrition, connectedness, and environment). The eight core lectures are supplemented by six 2-hour tutorials and self-directed learning. Students keep a journal and meet regularly with a tutor and in small groups. These elements are integrated into other elements of the core curriculum through lecture series, case-based learning, and assessment integrated into assessment of other components of the curriculum and the OSCE. Overall, the HEP curriculum is a significant portion of the first year curriculum, accounting for 10% of the total assessment load. Data before and after the intervention were available for 148 (55%) of students. 90% reported applying mindfulness practice, and there were statistically significant improvements in the depression, hostility, and General Severity Index of the Symptom Checklist-90, and in the psychological domain of the World Health Organization Quality of Life scale.

Contribution: This intervention is one of the longest-standing wellness curricula to be integrated into a core curriculum of a medical school, and although limited by its non-randomized design, demonstrated improvements in wellbeing measures before and after intervention. The assessment strategies are also

integrated into the overall medical school assessments in order to avoid marginalizing the wellness curriculum.

Cost: Unknown.

Rohe DE, Barrier PA, Clark DA, *et al.* The benefits of pass-fail grading on stress, mood, and group cohesion in medical students. *Mayo Clin Proc* 2006;81(11):1443-1448.
doi: 10.4065/81.11.1443

Impetus: Traditional 5-level, A through F, grading systems may promote competitiveness and anxiety, so many medical schools have moved to a pass-fail grading system in the preclinical years. Whether a pass-fail system promotes more cooperativeness and reduces stress in medical students, and whether it has an impact beyond the first year, is unclear.

Description: The Mayo Medical School in Rochester, MN moved to a pass/marginal pass/fail grading system for the first year only (followed by the traditional 5-level grading system retained in the second year) for the class of 2006. The authors prospectively studied students in the class of 2005 (both first and second year 5-level grading) compared to the class of 2006 (first year pass fail, second year 5-level grading) at the end of each group's first and again second year of medical school. They used well- validated self-reported tools for their primary outcomes of interest: Perceived Stress Scale, Profile of Mood States, Perceived Cohesion, Scale, and Test Attitude Inventory. The class of 2006 (pass-fail group) reported less stress and more group cohesion at the end of their first and second years than the (5-level graded) class of 2005, with a non-significant trend towards better mood in the class of 2006 and no difference in USMLE step 1 scores or test-taking anxiety.

Contribution: This study shows an association between the pass-fail system and lower levels of stress and greater perceived class cohesion, a benefit that persisted into the end of the second year of medical school. Because the study was non-randomized and baseline data were not collected prior to the start of the curricular change, it is unknown whether the groups were different at the beginning of medical school in these areas, and longer-term outcomes remain to be seen. This study offers a compelling case for the pass-fail grading system as a means to reduce student competition and stress.

Cost: Unknown.

Interns/Residents/Fellows

Bird A and Pincavage A. A curriculum to foster resident resilience. *MedEdPORTAL Pub* 2016;12:10439.
http://doi.org/10.15766/mep_2374-8265.10439.

Impetus: Burnout is highly prevalent in medical trainees, and is associated with depression, suicide, and poor clinical performance. A program to build resilience skills may improve wellbeing.

Description: A curriculum was developed to teach skills to help cultivate resilience and promote wellness. The series was delivered to 36 interns in 2014-2015 at the University of Chicago (participation rate: 85.7%), and included content related to setting realistic expectations, coping with medical errors, and gratitude. The workshop series included three 60-minute small group (10-12 participants) sessions delivered during the residency program's outpatient block lecture time, and was facilitated by a core member of the residency

program, including chief resident, core faculty, or associate program directors. Cases in skill building exercises were based on clinical events reported by trainees during the small group sessions. Participants found sessions to be valuable, with most interns encouraging the sessions to continue in the next academic year (69%). Specifically, they valued the open forum for reflection and discussing setbacks with colleagues and felt that it improved their comfort in discussing burnout and medical errors.

Contribution: A strength of the curriculum is its implementation within the residency program infrastructure, without requiring additional funding. The MedEdPortal toolkit may be a useful resource for other programs and includes a facilitator's guide, skill building exercise, and a resilience pocket card. Limitations of this curriculum are its lack of a comparator group, and that validated outcome measures of wellbeing are not reported.

Cost: Per personal communication with author (A. Pincavage), cost of developing the curriculum was mostly faculty time.

Brennan J and McGrady A. Designing and implementing a resiliency program for family medicine residents. ***Int J Psychiatry Med*** **2015;50(1):104-14. doi: 10.1177/0091217415592369.**

Impetus: Few studies have focused on interventions that promote resilience during residency training. The authors present a comprehensive program that incorporated both a longitudinal curriculum to teach individual-based resilience strategies, as well as program-level changes for improved community wellbeing.

Description: The program was developed at the University of Toledo Family Medicine Residency Program, a community program with 12 residents (mostly international medical graduates) that serves a suburban population. A needs assessment done prior to curriculum development ascertained residents' individual needs (increase self-awareness, learn stress management skills, improve their health behavior and learn better time management) as well as system-level needs (increased support and community-building social activities, adjusting rotation schedules to reduce stress, a team approach to problem solving, and increased resources for wellness-related activities). The curriculum included a longitudinal series of interactive and experiential sessions that addressed the above needs; positive psychology and mindfulness-based strategies were utilized in each session. Attendance was required; however, the authors note that residents did miss sessions due to rotations, vacations, and sickness. System-level changes included several unique ideas: daily 1-2 minute mindfulness meditation prior to inpatient rounds and prior to resident report/conferences, placing an elliptical machine in the call room, providing fruits and vegetables, and hosting a healthy cooking session lead by a chef and registered dietician. Additionally, residents were asked to fill out a "Health Risk Assessment" every 12 months which focused on the self-care element of resilience. Using this tool, residents were able to track their comprehensive wellness score and set longitudinal goals for improvement. Peer health coaches were utilized for additional self-care support and encouragement. The authors report that their intervention is being compared to a control group at another residency program, with baseline assessment of the Maslach Burnout Inventory, Connor-Davidson Resilience Scale, and Professional Quality of Life Scale; however, post intervention data are not presented. Evaluation data demonstrated high acceptance of the program, increased healthy food consumption and exercise, and decreased reactivity to stress.

Contribution: This paper reports an approach to successful resident engagement in programmatic and individual health-oriented change. Many novel ideas are presented that could be utilized by other residency programs. Although the authors report that another program serves as a comparison group, in this paper, only satisfaction measures are reported; follow-up data on wellbeing outcomes using validated scales will be useful to understand the impact of this intervention.

Cost: The project was supported by an Academy of Educators Grant at the University of Toledo Medical Center. Inferred cost would include time protected for curriculum session facilitators and for the gym equipment and fresh fruits and vegetables provided for residents.

Salles A, Nandagopal K, Walton G. Belonging: a simple, brief intervention decreases burnout. *J Am Coll Surg* 2013;217:S116. http://dx.doi.org/10.1016/j.jamcollsurg.2013.07.267.

Impetus: Attrition of residents is a significant problem facing general surgery residencies, with approximately one in five general surgery residents leaving for another field. Data from interventions to decrease attrition and mitigate contributing factors are lacking. This paper investigates whether an intervention to improve residents' sense of belonging decreases attrition.

Description: Junior residents from seven surgical specialties took a baseline survey of attitudes and beliefs, and were then randomized into either a belonging treatment or control condition. The intervention group spent 15-20 minutes reading anecdotes from senior residents describing challenging early residency experiences, while the control group read descriptions of challenging ethical dilemmas. Attitudes and beliefs were surveyed as a proxy for likelihood of leaving residency, and burnout was measured using the Maslach Burnout Inventory. Residents reporting feelings of belonging were more likely to report feeling they would complete residency ($P<0.01$). Mean scores for burnout items on the MBI post-intervention were lower in the intervention arm compared to the control arm ($P<0.05$), driven by decrease in emotional exhaustion, without significant change in depersonalization or accomplishment (personal communication with author A. Salles).

Contribution: There are relatively few interventions in the literature that are incorporated into surgical programs, so this intervention provides a valuable addition. Despite the simplicity of this intervention, it showed a significant impact on emotional exhaustion; however, the duration of this effect is unclear. This study suggests that personal anecdotes from senior residents can mitigate burnout and self-reported attitudes that may correlate with attrition from residency. The actual attrition rate for resident participants was not measurable during this follow-up period, and will be useful to understand the impact of this intervention on the outcome of attrition.

Cost: Unknown.

Dabrow S, Russell S, Ackley K, *et al.* Combating the stress of residency: one school's approach. *Acad Med* 2006;81:436-439. doi: 10.1097/01.ACM.0000222261.47643.d2.

Impetus: Resident assistance or wellness programs may help residents cope with personal and professional stressors that arise in residency. This paper describes the eight-year history of the University of South Florida College of Medicine Resident Assistance Program (RAP).

Description: The University of South Florida (USF) College of Medicine developed their USF Residency Assistance Program (RAP) in 1997, deliberately integrating it into GME training, and collected data on the program over eight years. The USF RAP was modeled after business employee assistance program but tailored to accommodate identified requirements for residency programs: it is broad-based, readily available, easily accessible, confidential and off-site. The RAP is firewalled from individual residencies, with confidentiality broken only in extreme circumstances such as suspected criminality. Each resident can receive up to three visits at no cost, with additional visits on a case-by-case basis. Services are provided primarily by psychologists and include counseling and referral services for residents and families; assistance is available 24 hours/day for urgent needs. Over 8 years, an average of 24 residents/year used the program (4.7%). Emotional difficulties were most common (52%), followed by marital problems (15%) and financial or legal problems (6.7% each). These frequencies were similar to those seen in business employee wellness program. In 2004 and 2005, 96.6% and 92% of residents, respectively, reported being aware of the RAP's existence (51% and 53% response rates). Although no formal outcomes data were measured, anecdotal experience indicates high acceptance.

Contribution: Given the scope of the intervention, the cost associated with its implementation is relatively low. Although limited by lack of specific wellbeing outcome measures, the program is widely known and has high acceptance as a resident resource.

Cost: Seven cents per resident per day, or a total of $15,000 per year to cover 580 residents.

Holmes AV, Socolar RR, Cull WL. Part-time residency in pediatrics: description of current practice. *Pediatr* 2005;116(1):32-7. doi: 10.1542/peds.2005-0127.

Impetus: Part-time residency training may provide flexibility for residents, which may have implications for wellbeing. This study describes the prevalence and structure of part time training options in pediatrics residency programs.

Description: This study surveyed 190 accredited pediatrics programs in 2003; 156 (83%) responded. 12% of programs had one or more part time resident from 2000-2003 (0.7% of all residents represented in the survey). Salaries were prorated in all programs, and most continued benefits and had a reduced call schedule. Child care was the most commonly cited reason for opting for part-time residency (67%). Part-time training extended residency by an average of 15 months. The authors also report that 24% of pediatrics programs advertise the option of part-time residency in the AMA Fellowship and Residency Interactive Electronic Database.

Contribution: This descriptive study provides an overview of the prevalence of and reasons for part-time residency training in pediatrics, as well as the impacts on benefits and length of training. Further studies are needed to determine whether part-time training improves resident wellbeing.

Cost: Unknown.

Schaff, EA and Hoekelman RA. Reduced-schedule pediatric residency training. *J Med Ed* 1984;59(10):815-24. PMID: 6481778

Impetus: Authors from the University of Rochester described outcomes in a small number of pediatric residents who chose an extended residency training schedule which included block time away from work.

Description: This paper describes reduced-schedule training for 15 pediatric residents at the University of Rochester between 1977 and 1982. Overall, 13% of 114 trainees who entered residency during that period chose schedules that included block time away from work. These scheduled were arranged *a priori* so that they did not have a negative impact on the total residency FTE, and therefore did not negatively affect residents who had full-time schedules. Data were collected on resident satisfaction with reduced schedules, difficulties encountered, patient care and educational outcomes and financial consequences. While some residents in reduced schedules did experience financial stress because of lower income during off blocks, and others had concerns about the increased length of time required to complete training, most residents felt that it improved their energy and enthusiasm for work, improved their professional self-confidence, and allowed them to focus more clearly on career goals. All residents would recommend this option to other residents who were considering it. Faculty were also surveyed, with a 92% response rate, and most felt reduced-schedule residents performed as well or better clinically than their regular schedule colleagues, with no negative effects on patient care or educational quality.

Contribution: This article suggests extending pediatric training to facilitate intermittent block time away from work was feasible, did not have negative educational or patient care consequences and was overall positively viewed by residents, although validated measures of wellbeing were not obtained.

Cost: University of Rochester authors commented that with advanced program-level planning, the reduced schedule option did not add any appreciable financial burden to the program.

System-Level Interventions

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. PMID: 27111930.

Impetus: Organization-wide models for increasing physician engagement and decreasing burnout have promise as sustainable, long term solutions to help establish constructive organization-physician relationships and develop physician leaders. The development of these relationships is critical to organization success, however little research is present to explain how to cultivate these relationships or their impact on physician burnout. This article describes the development and implementation of the "Listen-Act-Develop" model at the Mayo Clinic as an integrated strategy to reduce burnout through physician engagement in organizational mission.

Description: The authors of this article hypothesize that combating burnout involves both mitigating the structural and functional drivers of burnout, as well as bolstering individual resiliency. This article presents a case study of the Mayo Clinic and the development of the "Listen-Act-Develop" model to reduce burnout and increase physician engagement. The authors argue that higher levels of physician engagement are associated with positive outcomes such as improved team interactions, citizenship, and performance. They propose the "Listen-Act-Develop" model, which is based on organizational psychology and social science, with integration from institutional efforts related to quality improvement, safety culture, burnout-engagement and leadership development. The authors identified key needs of physicians, including choice, a sense of camaraderie, and the need for excellence at work. Specific tools that were used to measure outcomes were not provided. Institutional and program outcomes were referenced throughout the paper. Some of the metrics were validated tools, others were developed to assess the program(s) based on needs/extensive literature review.

Contribution: The model presented in this article demonstrates how an organizational wide approach that integrates multiple strategies/initiatives has been implemented at an institution. The model presented is very well thought out, and includes an extensive literature review. However, further research is required to fully understand how generalizable the model is to other institutions and how effective the model really is in reducing physician burnout and increasing job satisfaction.

Cost: Unknown.

Shanafelt T, Gorringe G, Menaker R, *et al.* Impact of organizational leadership on physician burnout and satisfaction. *Mayo Clin Proc* 2015;90(4):432-440. doi: 10.1016/j.mayocp.2015.01.012.

Impetus: There is little in the literature that links satisfaction with one's supervisor to overall physician job satisfaction or burnout. This study aimed to examine the relationship between supervisor leadership skills and physician/scientist burnout.

Description: This large survey-based study examined the link between leadership scores of supervisors and burnout/job satisfaction of physicians and scientists who worked under them. Nearly 3900 physicians and scientists from the three academic centers and 70 sites of the Mayo Clinic Health system were sent a survey in October 2013 that included demographic questions, burnout (Maslach Burnout Inventory) and a novel 12-dimension leadership scoring instrument. 72.7% of eligible participants responded to the survey and multivariable analysis was performed. For each 1-point increase in composite leadership score, there was a 3.3% decline in burnout and a 9% increase in the likelihood of job satisfaction.

Contribution: This study provides an important contribution to the literature on system-level interventions to improve physician/scientist wellbeing, as it is one of the first to demonstrate the suspected link between supervisor characteristics and job satisfaction. Higher quality leadership was associated with decreased burnout and increased job satisfaction among physicians being supervised. This finding may be useful to senior leadership (e.g. CEOs, CMOs, Deans, Department Chairs, etc.) when considering who to hire for high-level leadership positions, and should also prompt internal evaluation of leadership abilities to assess competence.

Cost: Unknown.

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 Health Work Place (HWP) Study. *J Gen Intern Med* 2015;30:1105–1111. doi: 10.1007/s11606-015-3235-4.

Impetus: Burnout is prevalent in primary care physicians and is often associated with the work environment. However, there are few studies which have examined the impact of workplace interventions on physician wellbeing and those that have are limited to single centers.

Description: This cluster randomized trial evaluated 166 primary care physicians who were recruited from 34 Midwest and New York City practices and represented a mix of urban, rural, and suburban environments at academic and non-academic centers. Interventions were grouped into three categories: (1) improving communication; (2) changes in workflow; and (3) quality improvement (QI) projects addressing clinician concerns. An office work life survey that evaluated time pressure, work chaos, and workplace control was

completed before and after the intervention. Physician burnout (modified MBI), satisfaction, and intention to leave were also evaluated. The study used tools adapted from the Physician Worklife (PWS) and Minimizing Error, Maximizing Outcome (MEMO) studies to measure outcomes at baseline and at 12-18 months. Response rate was 81.3% (135/166). Significantly more physicians who participated in the intervention had improved burnout and satisfaction. Lower burnout scores were specifically associated with workflow interventions and targeted QI projects, while improved satisfaction was associated with improved communication and workflow. Data was presented in aggregate and did not specify whether there were differences in outcomes comparing environments (e.g. urban vs. rural; academic vs. non-academic).

Contribution: This study demonstrates that innovation and attention to improved work conditions can have an impact on physician wellbeing. The major limitations of this study include the heterogeneity of the sampled practices and variation in intervention implementation.

Cost: The project was supported by a grant from the Agency for Healthcare Research and Quality (AHRQ).

Ripp JA, Bellini L, Fallar R, *et al.* The impact of duty-hours restrictions on job burnout in IM residents: a three-institution comparison study. *Acad Med* 2015;90:494–499. doi: 10.1097/ACM.0000000000000641.

Impetus: The 2011 duty hours reforms were implemented with an aim of decreasing medical errors due to work-related fatigue. Although fatigue from excessive workload is thought to contribute to burnout, especially to emotional exhaustion, the extent to which duty hours restrictions affect burnout in residents was unclear.

Description: In the study, first year residents at three large academic internal medicine programs (Mount Sinai, University of Pennsylvania, and Massachusetts General Hospital) were surveyed in 2008-2009 and in 2011-12 using the Maslach Burnout Inventory and Epworth Sleepiness Scale, allowing comparison of intern cohorts before and after implementation of 2011 duty hours reforms. Burnout was defined as meeting high sub-score threshold for either emotional exhaustion or depersonalization. For each intern cohort, burnout was measured in June prior to the start of the academic year and between April and June at the end of the intern year. The completion rate for the initial and follow-up survey was 62% (N=111) in the 2008-2009 cohort and 68% in the 2011-12 cohort (N=128). There was no significant difference for the 3-site cohort between 2008-2009 and 2011-2012 in end-of-year burnout prevalence (84% vs. 75%), or incidence (81% vs 68%), and no difference within sites. Residents who reported caring for >8 patients on a service had higher incident burnout in 2011-2012 as compared to 2008-2009. No significant difference in end of the year excessive sleepiness scores was found.

Contribution: This study's strengths include its multi-site cohort design before and after duty hours reforms were enacted. Although the design could be vulnerable to confounding due to use of a historical control cohort, rather than a randomized design, this study provides useful data to suggest that duty hours restrictions do not improve burnout or excessive sleepiness, confirms ongoing high prevalence of burnout in interns, and suggests that increased work compression under duty hours restrictions may be associated with incident burnout.

Cost: Unknown.

Parshuram CS, Amaral AC, Ferguson ND, *et al.* Patient safety, resident wellbeing and continuity of care with different resident duty schedules in the intensive care unit: a randomized trial. *CMAJ* 2015;187(5):321-329. doi: 10.1503/cmaj.140752.

Impetus: High-quality data to guide intensive care unit (ICU) scheduling decisions are limited. This study evaluated the impact of three resident ICU schedules on patient safety, resident wellbeing, and continuity of care.

Description: A randomized trial was performed on the in-house overnight schedules in 2 university-affiliated ICUs. Within 2-month long rotation blocks, residents were randomly assigned to overnight schedules of 24, 16, or 12 hours. Primary patient outcome measures were adverse events. Secondary patient outcome measures were preventable adverse events, death in the ICU, and severity of adverse events. Assessed outcomes were fatigue (Stanford Sleepiness Scale), burnout (Maslach Burnout Inventory) and somatic symptoms. Data from 47 residents (96% of sample), 971 admissions, 5894 patient-days and 452 staff surveys were analyzed. Residents reported more somatic symptoms with the 24-hour schedule (p =0.04); however, sleepiness and burnout did not differ in the three groups. Patient outcomes including adverse events, mortality and continuity of care were similar across the three schedules. However, this study was underpowered suggesting that significant effects might have been missed. Adherence to schedules was not monitored, which may have impacted the outcomes.

Contribution: The authors conclude that the findings do not support the alleged advantages of shorter duty schedules. However, a key finding is that is not adequately emphasized is that short duty schedules did not compromise patient safety and continuity of care while at the same time were associated with less physical symptoms in residents.

Cost: Unknown.

West CP, Dyrbye LN, Rabatin JT, *et al.* Intervention to promote physician wellbeing, job satisfaction, and professionalism: a randomized clinical trial. *JAMA Intern Med.* 2014;174(4):527-533. doi: 10.1001/jamainternmed.2013.14387.

Impetus: Physician burnout is a well-recognized problem, but most intervention studies focused on individual-level strategies such as mindfulness, which put the onus on the physician to make time to engage in a self-care activity. The goal of this study was to evaluate the impact of participation in facilitated support group sessions, for which the time was protected by the employer. Thus, this study is both an organizational-level intervention as well as a small-group intervention.

Description: A total of 74 academic Internal Medicine physicians were randomized to participate in a facilitated small group session or unstructured protected time. All participants received one hour of protected time every other week. Outcome measures included the Physician Job Satisfaction Scale, the Empowerment at Work Scale, the Medical Outcomes Study Short-Form Health Survey (which measures mental and physical health), the Maslach Burnout Inventory, the Perceived Stress Scale, the 2-item PRIMEMD (which screens for depression) and the Jefferson Scale of Physician Empathy. Quality of life and fatigue were measured by a single-item linear analog scale. In addition to study participants, 350 physicians not participating in the intervention were also surveyed in the same interval. The intervention group showed significant improvement in empowerment and engagement at work. Rates of high

depersonalization also decreased. The proportion of participants strongly agreeing that their work was meaningful also increased whereas the proportion decreased in the control and non-study cohorts, a finding that was statistically significant. These changes were evident by three months after the study and persisted at 12 months. There were no statistically significant changes in stress, symptoms of depression, quality of life or job satisfaction among the intervention group, control group and non-participants. Interestingly, rates of depersonalization, emotional exhaustion, and overall burnout decreased substantially in the trial intervention arm, decreased slightly in the trial control arm, and increased in the non-participants, all of which were statistically significant findings.

Contribution: This study is the first randomized trial evaluating an initiative with employer-provided protected time. Additionally, it showed that participation in a structured small group intervention format had a meaningful impact on several physician wellbeing measures.

Cost: The system supported one hour of paid time every other week (equal to 0.9% full-time equivalent).

Lucas BP, Trick WE, Evans AT, *et al.* Effects of 2- vs 4-week attending physician inpatient rotations on unplanned patient revisits, evaluations by trainees, and attending physician burnout: a randomized trial. *JAMA* 2012;308:2199–2207. doi: 10.1001/jama.2012.36522.

Impetus: Limited data exist on the effect of duration of internal medicine attending physician ward rotations as it relates to a variety of measures, including patient outcomes, learner ratings of attending physicians, and physician wellness.

Description: This cluster, randomized, non-inferiority study examined the impact of varying service rotation length (two vs. four weeks) on patient outcomes (unplanned revisit rates and length of stay), resident and medical student evaluations, and attending physician self-reported burnout. The study randomized attending physicians to a 2- or 4-week rotation on an internal medicine inpatient service at a single, public teaching hospital for one year. While there was no impact on patient length of stay and 30-day readmissions, there was a decrease in trainee perception of attendings' ability to adequately evaluate their team when on a 2-week rotation (vs. 4-week). The attending randomized to a 2-week rotation had lower burnout scores, as measured by the Emotional Exhaustion domain of the Maslach Burnout Inventory and other scales.

Contribution: Though this was a single-center study limited to an academic medical center, it is an important addition to the literature examining the impact of work-intensity on attending physician wellbeing beyond looking strictly at work hours. It generates a number of suggestions for future study, including the conduct of a similar intervention in trainees and consideration for optimal rotation length in relation to wellbeing, teaching and learning.

Cost: Support for this study was provided by a philanthropic gift from the Foglia Family Foundation.

Ali NA, Hammersley J, Hoffmann SP, *et al.* Continuity of care in intensive care units: a cluster randomized trial of intensivist staffing. *Am J Respir Crit Care Med* 2011:184(7):803-808.
doi: 10.1164/rccm.201103-0555OC.

Impetus: Little is known about the consequences of intensivists' work schedules or continuity of care. This study assessed two alternate intensivist staffing schedules to determine whether outcomes for patients and intensivists differed between these staffing schedules. This study evaluated the impact of weekend respite for intensivists, with consequent reduction in continuity of care, on them and their patients.

Description: A prospective, cluster-randomized, alternating trial of two intensivist staffing schedules was undertaken in five medical intensive care units (ICUs) in four academic hospitals. Daily coverage by a single intensivist in half-month rotations (continuous schedule) was compared with weekday coverage by a single intensivist, with weekend cross-coverage by colleagues (interrupted schedule). A total of 45 intensivists and 1,900 patients participated in the study. The impact of the intervention was measured on intensivist outcomes such as burnout, work home life imbalance, and job distress and patient outcomes including ICU length of stay, hospital length of stay and mortality. Intensivists experienced significantly higher burnout, work home life imbalance, and job distress working under the continuous schedule. ICU and hospital length of stay and mortality for patients did not differ significantly between the two work schedules. Continuity of care was significantly higher in the continuous work schedule.

Contribution: This study suggests that work schedules where intensivists receive weekend breaks improved the wellbeing of physicians without worsening patient outcomes. The authors suggest that this information can assist and inform intensivists, hospital administrators, and policy makers in choosing a model for intensivist staffing. There are two key potential limiting factors of the study: inadequate patient sample size and generalizability to ICUs that are not staffed with trainees and multidisciplinary teams that make up for lack of continuity of attending presence on weekends.

Cost: Unknown.

Dunn PM, Arnetz BB, Christensen JF, Homer L. Meeting the imperative to improve physician wellbeing. *J Gen Intern Med* 2007;22(11):1544-52. doi: 10.1007/s11606-007-0363-5.

Impetus: Physicians are put under increasing pressure to effectively and efficiently treat patients, resulting in increased burnout, stress, and job dissatisfaction. Physician burnout is associated with increased medical errors and patient dissatisfaction. Due to this correlation between physician wellbeing and performance, practice-level interventions designed to improve physician and organizational wellbeing are critical.

Description: The goal of this intervention was to improve individual physician wellbeing in single, small primary care practice from 2000-2005. The 3-pronged intervention included (1) practice leadership attention to the value of physician wellbeing, (2) identification of factors impacting wellbeing (i.e. control, order, meaning) and plans for improvement with accountability, and (3) regular measurement of wellbeing markers. Surveys were distributed annually and measured physician satisfaction (an unvalidated satisfaction survey by the American College of Physicians/American Society of Internal Medicine), burnout (Maslach Burnout Inventory), work environment quality (Quality Work Competence (QWC) Survey) and physician turnover. Physician satisfaction did not change significantly. However, emotional and work-related exhaustion of individual physicians and measures of organizational-health both significantly improved over the course of the intervention.

Contribution: Limitations of this study included its small sample size and the use of one unvalidated measure. However, this study provides a helpful framework for simple workplace interventions that can have an impact on physician wellbeing, particularly those that focus on control and meaning and leadership attention to physician wellbeing.

Cost: Unknown.

Culture Change

Cohen-Katz J, Sternlieb JL, Hansen SE, Dostal JA. Developing emotional intelligence in the clinical learning environment: A case study in cultural transformation. *JGME* 2016;8(5):692–698.
doi: 10.4300/JGME-D-15-00548.1.

Impetus: Although cultural transformation is thought to be an important element of wellbeing programs, the effect of implementing programs targeting culture change on resident wellbeing is unknown. This paper aimed to understand the impact of curricular changes to transform the educational environment and promote a culture of resident wellbeing through a mixed-methods approach.

Description: This paper describes a pilot study of a curriculum implemented in the Lehigh Valley Health Network Family Medicine Residency Program anchored on the concept of an emotionally intelligent learning community. That framework aimed to cultivate wellness through provision of time and space for self-care/reflection; safety through promoting vulnerability, asking for help, and admitting mistakes without fear of retribution; and development of interpersonal skills. Investigators used a mixed-methods evaluation strategy to examine data from 34 residents who were enrolled in the pilot program from 2007-2012. The measurements included the Fordyce Emotions Scale, Satisfaction with Life Scale, the Arizona Integrative Outcomes Scale, analysis of transcripts of "closing ritual statements" from resident assessment meetings, and analysis of transcripts from resident focus groups. Although quantitative measures of wellbeing did not change, themes from the qualitative analysis highlighted the positive culture and experiences with emotional awareness, self-care and reflection. The authors suggest that their results reflect that the intervention did not change the nature of the work, but rather normalized challenges of professional identity development. The authors hypothesize that existing psychometric tools may not be sensitive enough to capture valuable contributions from such interventions.

Contribution: This study suggests potential usefulness of programs that normalize difficulties of professional identity development, and raises the important question of whether or not these programs should be mandatory. Although this study did not have a randomized design and may not be generalizable as a single-site study of a small number of residents, this study illustrates the value of rigorous qualitative evaluation to understand the impact of wellbeing interventions. The survey measures used in this study are not commonly used in current wellbeing research, and because burnout was not measured, we do not have an understanding of whether this program had an impact on burnout.

Cost: Unknown.

Salyers MP, Bonfils KA, Luther L, *et al.* The relationship between professional burnout and quality and safety in health-care: a meta-analysis. *J Gen Intern Med* 2016;32(4):475-82. doi: 10.1007/s11606-016-3886-9.

Impetus: Provider burnout has been associated with increased medical and surgical errors and decreased patient satisfaction, however the consistency and magnitude of the relationship between burnout and health-care quality and safety has not been systematically, studied across disciplines.

Description: This publication is a meta-analysis of 82 published and unpublished, predominantly cross-sectional studies involving 210,669 health-care providers from 33 countries and multiple disciplines, across inpatient and outpatient settings. Studies were included if empirical data was used to quantify the relationship between burnout, quality and safety. Statistically significant negative relationships between burnout, care quality and safety were identified, with small to medium effect sizes. Greater provider burnout was associated with lower perceived care quality, reduced patient satisfaction, reduced quality indicators and reduced perceptions of safety. Potential moderators of the burnout-quality relationship were explored, including dimension of burnout, quality data source and unit of analysis (from individual provider to hospital/organization). Effect sizes were significantly stronger for individuals compared to larger service units, for emotional exhaustion compared to other dimensions of burnout, and whether providers were the quality data source. Potential moderators of the burnout-safety relationship were also explored, including safety indicator type, discipline (physician, nurse or interdisciplinary sample) and country. Effect sizes were stronger for nurses compared to doctors, and when providers were the safety data source. The potential impact of study rigor, outliers and publication bias was also assessed.

Contribution: This is the first study to systematically and quantitatively analyze the relationship between health-care provider burnout and health-care quality and safety across disciplines and countries. Provider burnout accounted for approximately 7% of the variance in perceived quality and 5% of the variance in perceived safety of care. These relationships were robust to potential publication bias and ratings of study rigor, and highlight the consequences of burnout on the healthcare system at large.

Cost: Unknown.

Eckleberry-Hunt J, Van Dyke A, Lick D, Tucciarone J. Changing the conversation from burnout to wellness: Physician wellbeing in residency training programs. *J Grad Med Ed* 2009;1(2):225-30. doi: 10.4300/JGME-D-09-00026.1.

Impetus: When this paper was written, few interventions to support wellbeing in residency had been described in the literature. This paper seeks to define a holistic definition of wellness and provide a toolbox to create a culture of wellness in residency.

Description: This paper is a retrospective description of the development of a wellness program to promote "cultural change" in the Troy Family Medicine Residency, a community-based, university-affiliated family medicine residency program with 22 residents. They outline a "Wellness Toolbox" that includes ingredients for changing residency culture to be in support of wellness, as opposed to simply "preventing burnout." The Toolbox emphasizes the importance of having a faculty "wellness champion" with protected time to develop a wellbeing curriculum, measure burnout, and develop a curriculum with lectures and reflection space, among other suggestions. Importantly, they prioritize the need for a residency to agree on a shared definition of wellness and its components that is more than just the absence of burnout. The authors describe organizational changes that have resulted from this program, including establishment of "wellness

partners" for each resident and increased openness to discussing burnout. The authors do not provide formal qualitative or quantitative outcome data on the effectiveness of the interventions.

Contribution: Although this paper does not provide formal evaluation data, it provides a useful case description of one program's experience implementing broad-based, stakeholder-driven initiatives to enhance a culture of wellness. It may be especially useful as a starting point for programs that are beginning to develop wellness interventions. Though a useful framework, some of the specific strategies that are recommended may not be generalizable or feasible for large programs.

Cost: Unknown.

Sheehan D, Wilkinson TJ, Billett S. Interns' participation and learning in clinical environments in a New Zealand hospital. ***Acad Med 2005:80*****(3):302-308. PMID: 15734818.**

Impetus: Successful resident learning is a combination of individual processes and collaborative and social processes. To maximize learning by residents, it is critical to understand not only the behaviors residents need to learn, practice and display, but also the characteristics of the clinical environment that promote resident involvement with clinical teams.

Description: This study explored intern engagement in their clinical training programs at a New Zealand hospital through interviews and focus groups. Interview questions were designed to seek information about perceived useful clinical experiences, levels of team involvement and interaction, and situations or behaviors that facilitated or inhibited learning. Researchers synthesized data from interviews to create emerging themes and propose a tentative model that informed focus group discussions. Additional data was collected, analyzed, and combined with initial data to develop a second model. This revised model was presented to two groups of teaching practitioners for reactions, comments, and proposed revisions. Data was used to create a final model, which supported themes generated throughout the study.

Contribution: A model of resident participation and learning was developed, which identified components necessary for the creation of positive learning environments. These include institutional factors, barriers, and individual behaviors that impact participation and learning. Factors that encouraged participation included individual team members taking responsibility; learners' ability to identify group attributes, preferences, and informal guidelines; positive relationships between resident and supervisor; interactions between resident learners and experienced staff; and the use of questioning and feedback practices by these experienced practitioners. Lack of time with a supervisor was found to be a critical barrier to participation and learning. Future application of the model is proposed and includes faculty development, rotation design, and educating students and residents.

Cost: Costs were not discussed, but likely included qualitative research costs of transcription, which is time- and person-intensive.