Review article

Framework for advancing equity in academic medicine and science: Perspectives from early career female faculty during the COVID-19 pandemic

Sade Spencer [*], Catherine Burrows, Sarah E. Lacher, Kait C. Macheledt, Jerica M. Berge, Rahel G. Ghebre

Department of Pharmacology, University of Minnesota Medical School, 3-212 McGuire Translational Research Facility, 2001 6th St SE, Minneapolis, MN 55455, United States

A B S T R A C T

Early-career female faculty, both physician scientists and basic researchers, have disproportionately experienced negative professional, financial, and personal consequences associated with the novel coronavirus disease 2019 (COVID-19) pandemic. This career phase represents a critical time for establishing a network of mentors and collaborators, demonstrating professional independence, and balancing new teaching, research, and service duties while simultaneously navigating personal and familial responsibilities. Persistent gender inequality perpetuated by adherence to traditional gender roles place early-career women faculty at a further disadvantage. Women in academic medicine and research do not attain promotion, leadership positions, and other established markers of success at the same rate as their male counterparts. This disparity was the impetus for the creation of a Recruitment and Retention action group within the Center for Women in Medicine and Science (CWIMS) at the University of Minnesota Medical School (UMN). This perspective piece is written from the viewpoint of a group of female-identifying early-career faculty participating in a career development program for early-stage and newly appointed faculty at UMN, sponsored by the Recruitment and Retention CWIMS action group and our Office of Faculty Affairs. We describe areas of stress exacerbated by the COVID-19 pandemic: work, financial, and work-life well-being, and propose an adapted diversity, equity and inclusion (DEI) model to guide the response to future challenges within a faculty competency framework. We offer recommendations based on the DEI-competency framework, including opportunities for lasting positive change that can emerge from this challenging moment of our collective history.

1. Introduction

The novel coronavirus disease 2019 (COVID-19) has disrupted nearly every function at academic medical centers across the country (Ferrel and Ryan, 2020; Colenda et al., 2020; International Association of Universities, 2020). These disruptions have the potential to exacerbate existing systemic barriers to faculty promotion and advancement felt by disadvantaged groups, including people who are early in their career stage, female, and Black, Indigenous, and people of color (BIPOC). Prior to the pandemic, women faculty experienced unique barriers to promotion and advancement to leadership positions (Ellinas et al., 2018; Ellinas et al., 2019). The COVID-19 pandemic has already had a disproportionate negative impact on the professional and financial

prospects of early-career faculty (Agarwal et al., 2018; Brown, 2013; Good et al., 2013). Conversely, these same faculty have not equally benefited from some of the opportunities resulting from the COVID-19 response (e.g. new funding and collaborations). Relatedly, women are underrepresented in COVID-19 research authorship (Andersen et al., 2020; Pinho-Gomes et al., 2020; Viglione, 2020), and expert female voices were conspicuously absent from COVID-19 media coverage early in the pandemic (Carr, 2020). At the intersection of gender and career status, early-career female faculty (ECFF) may be particularly disadvantaged due to enduring gender inequity, including in the division of domestic labor, as work and home life have merged during the COVID-19 pandemic (Myers et al., 2020; Grose, 2020; Rhubart, 2020). The lasting impacts of COVD-19 remain unknown, and there will likely be

differing effects on faculty based on career status and access to opportunities. Thus, our aim in sharing this perspective is to heighten awareness of key issues of concern and provide recommendations for addressing clinical, research, education, financial, and work-life well-being factors in the lives of ECFF.

Our group of ECFF participated in the University of Minnesota's (UMN) Center for Women in Medicine and Science (CWIMS) (Berge et al., 2020) Early Career Pathways to Success program during the COVID-19 pandemic. This Early Career Pathways group collectively shared our lived experience of the impacts of COVID-19 and identified themes that arose surrounding COVID's impact on different elements of faculty competency, professional, and personal life. The co-authors refined this list and shared it back to the Early Career Pathways faculty group and the Office of Faculty Affairs (OFA) to ensure representativeness of the themes both within our group and more broadly across the faculty of UMN. The co-authors developed a set of recommendations based on the impact/concerns list and our proposed diversity, equity and inclusion (DEI) framework (described below and in section 4) and requested additional feedback from both the Early Career Pathways group and OFA. We employed an iterative process, as recommended in our framework, to produce the final product.

Out of our learned experience, we propose a model for advancing diversity, equity and inclusion in these unprecedented circumstances that address the issues of ECFF now and can inform policies for the future (Fig. 1). We have placed our commitment to DEI at the center of our framework because this commitment represents both a core competency for all faculty and a guiding principle for the other seven professional competencies deemed essential for faculty success: leadership, professionalism, well-being, community engagement, teaching, clinical care, and translational research and scholarship. The precise composition of the "pie" in the inner circle of competencies will vary for individual faculty based on their discipline, role and career stage (Harris et al., 2007). Moving outward, we incorporate our adaptation of the COVID-19 DEI action framework (Williams, 2020) into this competency model (described in Section 4) (Milner et al., 2011). DEI practices and policies should be embedded in the decision-making process that relates to the action steps in the outer circle of our framework. It is imperative to approach DEI action plans by first considering the numerous ways in which people can be marginalized, the unique barriers confronting different groups, and how the intersection of identities can put some communities or individuals at greater disadvantage. Thus, the outer circle of the framework applies to the organizations that are tasked with developing policies to support faculty success.

The COVID-19 pandemic combined with reckoning with racial inequality, economic disparity, natural disasters, and political polarization have forced a critical reexamination of the persistent inequities in the United States and within academia. Signs of disparate impact of this pandemic on women in the workforce are emerging and underline the urgency of tackling persistent gender disparity in academic medicine. We propose recommendations on issues related to research, education, financial, and work-life well-being identified as salient based on our own personal experiences but with the recognition that they apply to other marginalized, underrepresented, and disproportionately-affected communities (Table 1). We hope those in leadership with the capacity for enacting policy at universities nationwide recognize the unequal impact of stressors like COVID-19 and racial injustice, and incorporate the suggestions offered here in ethical decision-making based on our proposed faculty competency and organizational action framework (Fig. 1).

2. Immediate impact and concerns

2.1. Professional: impacts on clinical care

On March 7, 2020, the first confirmed Minnesota case of COVID-19 was reported at UMN, MHealth Fairview (Minnesota Department of Health, 2020). Since then, there have been many 'firsts' for our patients,
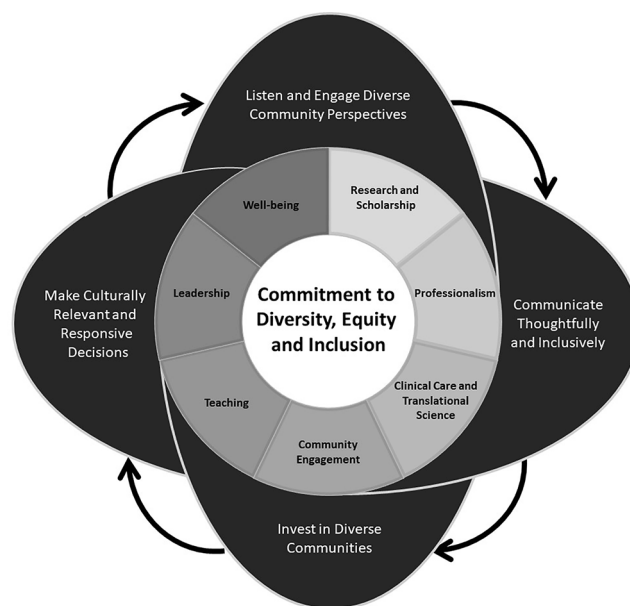

Fig. 1. The faculty competency framework (University of Minnesota Medical School Office of Faculty Affairs, 2021) within the inner circle is adapted from the UMN Office of Faculty affairs and encompasses seven professional competencies considered to be important for faculty success in an academic medical center. The inner seven competencies are applicable to all faculty, but here we address them specifically in relation to early career female faculty (ECFF) needs. Depending on the nature of the faculty appointment (e.g. clinical or basic science department) and track (e.g. academic, clinician, research) the relative weight of competencies will differ. For example, within our group of co-authors there is representation of at least one faculty member that devotes most of their time to research, teaching, or clinical practice. The other four competencies (professionalism, community engagement, well-being, and leadership) can be applied to all faculty independent of their appointment type. Based on these competencies, our group of ECFF propose recommendations in Table 1 on issues impacting faculty success across multiple professional and personal domains that we identified as salient based on lived experiences during the COVID-19 pandemic. In the outer circle, we incorporate action steps that are applicable to the institution or organization (i.e. the hospital and/or university system). These steps have been adapted from a published DEI framework (Williams, 2020) and are meant to be applied in an ongoing, iterative and cyclical process of decision-making related to the impacts on each competency domain within the inner circle. In our Opportunities and Recommendations (Table 1), we call out these action steps as they relate to issues impacting core competencies.

families, students, staff, and faculty. Women faculty continued to provide quality care in the midst of COVID despite personal stressors (Dewey et al., 2020; Pappa et al., 2020). Dedicated clinical faculty and staff risked personal COVID-19 exposure to perform essential duties (Cheng et al., 2020). Pregnant women faculty continued to provide clinical care, albeit with uncertainty around best practices for pregnancy care and COVID-19 (Woodworth et al., 2020). Those not directly caring for COVID-19 patients also experienced heightened stress associated with changes in clinical care due to physical distancing restrictions, increasing complexity, and rapidly changing protocols in clinical care services. Initiatives introduced to protect patients and healthcare providers led to drastic decreases in clinical volume, a shift away from specialty services to primary care and infectious disease, and a rapid expansion of telehealth (Provenzano et al., 2020; Hollander and Carr, 2020). Some clinical faculty were in the process of completing their board certification, and low patient volume may have delayed their preparedness to sit for exams.

Unfortunately, the speed and magnitude of clinical care changes provided few opportunities for ECFF to lead, leaving many feeling disconnected from their work support system and uncertain about their role within the changing health system. As we emerge from the crisis of

Table 1
COVID-19 and early career female faculty: issues and opportunities.

Work	Issues of Concern		Opportunities and Recommendations		
	Immediate	Long-Term	Immediate	Long-Term	DEI Competency Framework
All Academic Medicine Faculty	• Disconnected from, or unable to form work-based support systems • Difficulty acquiring Personal Protective Equipment • Risk of COVID-19 exposure during performance of essential work and among special populations such as pregnant women	• Interruption in career progress and advancement • Uncertainty on the long-term impacts of COVID-19 exposure • Challenges in faculty retention	• Battle Buddies (Antecol et al., 2018) framework for stress-related programming	• Encourage "Balance Buddies" and/or "Equity Buddies" framework for sustained stress-related programming	• Well-Being • *Invest in Diverse Communities*
			• Provide supports for remote work and work autonomy		• Well-Being • Professionalism • *Invest in Diverse Communities*
			• Provide opportunities for listening sessions		• *Listen and Engage Diverse Community Perspectives*
			• Request feedback frequently and consistently		• *Make culturally relevant and responsive decisions*
				• Invite early-career faculty to present at institution seminars	• Research and Scholarship • Leadership • *Invest in Diverse Communities*
Clinical Focused Faculty	• Working on the edge of capacity due to speed and magnitude of care standard changes • Uncertain of role now and in near future due to changing health system • Changes in clinical practice impacting achievable productivity targets and salary	• Stagnated clinical practice growth • Challenges in meeting pre-COVID-19 expected work productivity volume and expectations • Delay in completing timely board certification • Lack of voice in practice decision making	• Include early-career faculty in decision making	• Integrate early-career faculty into developing institutional response to changing health system	• Clinical Care and Translational Science • *Make culturally relevant and responsive decisions* • *Listen and Engage Diverse Community Perspectives*
			• Increased access to telehealth	• Reduce institutional barriers to telehealth	• Clinical Care and Translational Science • Wellbeing
			• Adjust anticipated work productivity		• Clinical Care and Translational Science • *Communicate Thoughtfully and Inclusively*
				• Promote and reward excellence of early-career clinical faculty work	• Clinical Care and Translational Science • Leadership • Professionalism
Research Focused Faculty	• Lacking sufficient preliminary data to generate manuscripts and grant applications • Lacking large backlog of data to continue with productivity • Lab space co-opted for COVID-19 research and response • Difficulty acquiring basic lab supplies	• Difficulty mentoring and filtering projects to trainees • Barriers to future funding success • Canceled conferences and event leading to gaps in CV and missed opportunities for exposure and building national and international reputation • Reduced capacity for establishing new research collaborations	• Virtual conference meetings allowing for expanded international impact and platform for those presenting		• Research and Scholarship • Leadership
			• Specific representation on relevant committees and teams that are assembled to craft policy at this time	• Formally recognize the currently *invisible work* in promotion and tenure process	• Leadership • Professionalism • Community Engagement; • *Communicate Thoughtfully and Inclusively* • *Listen and Engage Diverse Community Perspectives*
			• Create funding mechanisms not connected to pre-existing grants (e.g., NIH supplements)	• Create internal funding mechanism that prioritizes projects with multiple PIs that include junior faculty and diversity in gender and race	• Research and Scholarship • *Invest in Diverse Communities*
	• Influx of time-demanding tasks (student emails,		• Environmentally-friendly educational model, reduce the use of resources		• Teaching

Table 1 (*continued*)

Work	Issues of Concern		Opportunities and Recommendations		
	Immediate	Long-Term	Immediate	Long-Term	DEI Competency Framework
Education Focused Faculty	training, online curriculum develop, learning new virtual technologies) • Changing policies regarding needs, requirements, and legalities of virtual learning	• Reduced time for publications and manuscripts • Learner uncertainty around change to virtual model may lead to poor evaluations			• *Make culturally relevant and responsive decisions*
			• Facilitating student mastery of content through more individualized and student-oriented level resolution	• Opportunity to individualize small group-based learning	• Teaching • *Make culturally relevant and responsive decisions* • *Listen and Engage Diverse Community Perspectives*
			• Making materials available ahead of time to learners	• Opportunity to further develop curriculum to include health disparities, diversity of perspective and culture responsive curriculum	• Teaching • *Communicate Thoughtfully and Inclusively* • *Make culturally relevant and responsive decisions* • *Listen and Engage Diverse Community Perspectives*
			• Design of engaging learning platforms for more interactive content delivery	• Expand educational opportunity for distance learning (global health)	• Teaching • Community Engagement • *Make culturally relevant and responsive decisions*
Financial	**Issues of Concern**		**Opportunities and Recommendations**		
	Immediate	Long-Term	Immediate	Long-Term	
Clinical, Research, & Education Focused Faculty	• Compensation reduction • Increased childcare costs • Financial stressors for single persons or single earning families	• Early-stage faculty face larger education debt burden • Increasing gap in pay for women faculty	• Salary cuts based on a tiered system	• Measure and address gender-based salary disparity	• Well-Being • *Make culturally relevant and responsive decisions* • *Invest in Diverse Communities*
			• Extend guaranteed salary for early-career faculty facing challenges in establishing new practices		• Well-Being • Research and Scholarship • Clinical Care and Translational Science • *Make culturally relevant and responsive decisions* • *Invest in Diverse Communities*
			• Support research funding gaps	• Institutional investment on working women by funding initiatives to support women at work (childcare services, flexible schedules)	• Well-Being • *Make culturally relevant and responsive decisions* • *Invest in Diverse Communities*
			• Provide option to extend promotion and "early career" status	• Re-evaluate promotion and tenure practices that stall early-career faculty from access to salary increases	• Well-Being • Research and Scholarship • Clinical Care and Translational Science • *Make culturally relevant and responsive decisions*
Work/Life Well-Being	**Issues of Concern**		**Opportunities and Recommendations**		
	Immediate	Long-Term	Immediate	Long-Term	
Clinical, Research, & Education	• Blending work and family obligations in the same space can lead to blurred boundaries between work and family life, such as working late or early	• Combining work and family life obligations overtime such as long-term distance learning for children may result in less sleep and	• Model healthy work-life balance at leadership level • Encourage vulnerable and honest communication at every level of leadership (ex. Discuss	• Childcare reimbursement for in-home care • Paid Retention Leave (e.g. adapt sabbatical leave model for other indication)	• Well-Being • Leadership • *Communicate Thoughtfully and Inclusively*

Table 1 (*continued*)

Work	Issues of Concern		Opportunities and Recommendations		
	Immediate	Long-Term	Immediate	Long-Term	DEI Competency Framework
Focused Faculty	hours to accommodate childcare needs	lower quality work/ productivity • Reduced early faculty retention	mental and physical well-being, using vacation, sick days, etc.) as actions beneficial to the organization, not just the individual		• *Invest in Diverse Communities*

Footnote: The DEI Competency Framework column reflects relevant intersections with faculty competencies and the action steps (in italics) as referenced in our conceptualization of the Diversity, equity and inclusion framework for early academic faculty success which merges a faculty competency framework (University of Minnesota Medical School Office of Faculty Affairs, 2021) with a published DEI framework (Williams, 2020) (Fig. 1).

COVID-19, changes experienced by ECFF may persist and are likely to stagnate clinical practice growth of ECFF. High levels of patient care early on are necessary to establish an area of expertise, grow clinical reputation, meet productivity expectations, and establish research programs. There is no clear road map for clinical care service moving forward immediately after this crisis, and key initiatives like expansion of telehealth and focus on emerging infectious diseases will likely stay. Some less desirable outcomes like contraction of health systems, loss of financial earning and increasing complexity of healthcare delivery cause uncertainty and anxiety in early career faculty associated with their perceived capacity to meet work expectations in the near future.

2.2. Professional: impacts on research

Early in the pandemic, universities importantly prioritized safety over productivity suspending most research not related to COVID-19. Some researchers were well positioned to study COVID-19 (e.g. virologists, immunologists, epidemiologists, health disparities experts) or were able to creatively pivot. However, the speed of response required to take advantage of COVID-19 research opportunities necessitated an established work process and network that many early career faculty inherently lack. Other scientists turned to analyzing existing data sets, writing papers, and preparing grant proposals, allowing them to maintain some level of productivity (Korbel and Stegle, 2020). Less established research programs, including ECFF-led, may not have had large backlogs or sufficient preliminary data to generate manuscripts and grant applications. New faculty were negatively impacted by hiring freeze policies, and existing staff could not complete training or collect much, if any, new data. At the same time our trainees were experiencing psychological distress and disrupted educational progress (Araújo et al., 2020; Yan, 2020). The pandemic further highlighted the unequal distribution of emotional labor related to supporting trainees and performing discipline-related service, more often falling on female and BIPOC faculty, with serious consequences for productivity of ECFF.

Plans in place before COVID-19 were almost universally altered. Laboratory and clinical shutdowns interfered with the collection of preliminary data to support competitive grant applications, potentially delaying funding and resulting in lapsed support. Prior to extensive adoption of virtual platforms, conferences and speaking engagements were widely cancelled leaving gaps in curriculum vitae, which could influence faculty members to delay applying for promotion. The inability to network in the typical fashion at meetings may have hindered the establishment of new collaborations. Some of the restrictions related to the pandemic also negatively impacted ongoing collaborative work. Lost time will not be fully captured by the number of months away from the laboratory or clinic. Given the diversity of impacts, it will be challenging to make system-wide adjustments for research and grant expectations down the line.

2.3. Professional: impacts on education

As universities transitioned from in-person to online teaching educators had to navigate a deluge of emails, training modules, and changing policies regarding the needs, requirements, and legalities of learning in a virtual space. Learning to maneuver in this constantly changing landscape took significant time away from preparing the educational content itself and reduced time for other scholarly activities. Early career faculty perhaps more readily accepted the shift to online learning because of their technology savvy, though the time investment required to build an online curriculum was significant. This lost time has impacted the career trajectory, publication rate, and grant submissions/ awards of early career faculty more than senior faculty, and women more than men (Myers et al., 2020). Another concern is that learners who were unsatisfied with online instruction in general may have provided negative evaluations which could carry more weight for early career faculty whose promotions are determined using these evaluations. Documented gender biases, particularly for ECFF, in university teaching evaluations (Mengel et al., 2019) may become more pronounced and have lasting impacts following the pandemic.

2.4. Financial impacts

COVID-19 has had a substantial financial impact on academic medical centers. In response to immense financial losses universities faced difficult choices (Colenda et al., 2020). Many institutions laid off or furloughed staff, reduced employee salary, halted retirement contributions, and suspended travel-related cost reimbursement (Whitford, 2020). These financial impacts will have a disproportionate effect on ECFF who likely have more debt and less savings than their senior colleagues. In addition, an increasing number of women are the sole or primary breadwinner for their families, and salary reduction may place the family in financial vulnerability (Shaw et al., 2020). For early career clinical faculty, there is apprehension that pressure to generate revenue through patient care will come at the expense of research and other scholarly endeavors essential for career development. For early career research faculty, there is significant trepidation related to research funding. Many laboratories donated research supplies and personal protective equipment without any expectation of these costs being recouped- although at UMN there were efforts made to offset some of these costs. In addition, laboratories continued to incur costs associated with lab upkeep and personnel, including students and postdocs, while shuttered or operating at diminished capacity. For education-focused ECFF, out-of-pocket expenses may have been incurred to acquire adequate equipment (hardware and software) to effectively teach online. The financial impact of COVID-19 will affect the individual and the institution long past the pandemic, and the force of the impact is deeply felt by those in vulnerable situations.

2.5. Work-life well-being

Early career faculty often report feeling stressed, overwhelmed, worn out, and risk succumbing to burnout (Hollywood et al., 2019; Shah et al., 2018). Women in academic medicine experience more challenges with work-life well-being than male colleagues (Strong et al., 2013). The

combination of work and home-life stressors during COVID-19 created a high potential for a variety of adverse psychological and physiological impacts on well-being including burnout, psychosocial stress, sleep disturbances, work-family conflict (WFC), exhaustion, and illness at a time when normal social support systems and stress-relieving outlets were inaccessible (Guille et al., 2017; Salvagioni et al., 2017). Prior to the pandemic, physicians and medical trainees showed an increased risk of depression, burnout, and suicide compared to the general population (Kingston, 2020). The relative risk is even greater in female physicians (Duarte et al., 2020). Systematic analysis of the impacts of COVID-19 on physician suicide and mental health remain outstanding, but early on, experts predicted increased rates of depression, anxiety, and suicide owing to increased workload, decreased social support, and chronic stress (Kingston, 2020). The mainstream media has heightened awareness of this long standing issue by calling attention to a number of high profile case studies of healthcare worker suicide during COVID-19 (Jahan et al., 2021).

The division of domestic labor and caretaking responsibilities is often unequal in a hetero-cisnormative family frameworks, with the gendered division of labor resulting in a higher burden for women (Krantz-Kent, 2009). This remains true for women working full-time outside the home, including in high-stress careers like academic medicine and science. Most scholarship related to division of domestic labor is based on opposite-sex couples, and although research suggests that division of labor may be more equally distributed in same-sex couples, specialization and segregation can still occur especially when minor children are present in the home (Bauer, 2016). ECFF may find themselves caring for children and/or elderly parents while navigating this critical career stage. Gender disparities in caretaking continued during COVID-19 (Grose, 2020; Rhubart, 2020). The educational needs of school-aged children were an exceptional burden taken on by parents during shutdowns with career sacrifices negotiated between caretakers in dual income households (Collins et al., 2021; Duxbury et al., 2007). Similarly, the stress of caring for elderly or sick relatives was compounded by the attendant risks of the COVID-19 virus. These situations have the capacity to influence levels of WFC and negatively impact long term retention and promotion of ECFF (Matulevicius et al., 2021).

3. Opportunities and recommendations

3.1. Professional: clinical care

Communication is often vertical in clinical practice settings, placing the power of decision-making in the hands of senior clinicians and department heads. However, clinical ECFF are at the forefront of patient facing services with many personally providing COVID-19 care. Healthcare workers responded to this unprecedented clinical care challenge of COVID-19 with a unified sense of shared sacrifice putting forward their best efforts for the common benefit of society. Ongoing challenges such as the long-term sequelae of COVID-19 infection, persistent disparity in health care, and increasing national unmet burden in mental health call for more rapid and innovative solutions (Blumenthal et al., 2020). The inclusion and consideration of women and BIPOC faculty in exploring solutions to this and continued health system challenges can lead to more equitable solutions and contribute to improved institutional culture. Therefore, it may be prudent to abandon tradition by placing clinical leadership into the hands of diverse young faculty, especially women and BIPOC, building an inclusive decision-making culture to promote an environment of shared sacrifice and victory. Other strategies to support clinical ECFF in managing continued stress of providing patient care under COVID-19 must be built on reinforcing a culture of inclusive bidirectional communication, continued investment in clinical mentorship, and promotion of work-life well-being.

3.2. Professional: research

The specific and unique needs of ECFF should be given priority as institutions and funders make research-related decisions in the recovery process to mitigate the risk of failing to retain these faculty. Universities may need to adjust requirements to acknowledge the limited opportunities for conference presentations, publications, and grants in this period. ECFF should document the impact of the pandemic in terms of added work in the professional and domestic domains. COVID-19-related grant opportunities were abundant at the start of the pandemic; UMN sponsored internal rapid response grants to study COVID-19 and racial and ethnic disparities in healthcare, but we have already alluded to the challenges faced by ECFF in competing for this funding. We recommend utilizing internal mechanisms to promote the formation of diverse research teams, including male and female and junior and senior investigators, to establish collaborations that will be competitive for extramural funding such as the National Institutes of Health (NIH). Policies thus far implemented at extramural agencies like the NIH fail to account for cascading effects beyond the immediate time frame. Additional mechanisms may be necessary for long-term retention of current ECFF in academic medicine. Many universities have extended the tenure promotion timeline, however conventional solutions like this may not be equally beneficial as intended (Antecol et al., 2018). For tenure review boards, holistic evaluation metrics should be devised to more comprehensively evaluate the individual with respect to *all* seven professional competencies (Fig. 1). This includes recognizing the invisible work disproportionately performed by women, BIPOC, and other faculty from underrepresented or marginalized groups (Social Sciences Feminist Network Research Interest Group).

As we emerge from COVID-19 restrictions, temporary fixes like virtual conferences may offer long-term solutions for some of the current underrepresentation of women at professional meetings in addition to ongoing efforts to create gender balance in scientific representation (Corona-Sobrino et al., 2020). Organizers must continue to prioritize and promote female, early career, and diverse faculty by inviting them for virtual (and in-person) presentations to bolster their visibility and curriculum vitae, both of which are important for promotion and tenure. Inviting ECFF as speakers may also enhance opportunities for establishing inter-institutional collaboration and networks for ECFF.

3.3. Professional: education

Transitioning to a virtual space for delivery of our medical school curriculum provided welcomed opportunities to improve the educational experience, garnering positive feedback from students and faculty. Group-based activities provided opportunities for small group student-driven learning, and allowed faculty to track student progress with organized, consistent online tools. Students have communicated the benefits of having content and objectives made available in advance of the lecture, which allowed for self-paced learning. Other innovations developed for online courses included interactive public discussion boards where students posted questions for the review of content experts. Students requested that these discussion boards continue for both virtual and future in-person instruction. Faculty have utilized the learning management platform Canvas (by Infrastructure) in a new way; students viewed lectures in small segments that required them to respond to questions and prompts before advancing. Providing lecture-based curriculum in this way facilitated mastery of content and allowed faculty to track progress at a more individualized, student-oriented level of resolution. Additionally, faculty triangulated resources and made the most of Zoom capabilities including polls and breakout rooms pairing them with other interactive components including Jamboard or similar platforms. These innovative online components should be carried forward into future learning strategies. Medical education also has opportunities for new pathways. For example, the UMN Medical School has provided pilot funding on innovation in education to address minority

health outcomes of COVID-19.

3.4. Financial

University leaders would benefit from considering the unique challenges of ECFF when planning salary cuts and other cost-saving initiatives to compensate for the economic impacts of COVID-19. Many institutions created "tiers" of cuts based on total salary, but they could also consider early-career status when determining reductions. Providing faculty members with a choice between taking a salary reduction and furlough may also help faculty find the best-fit solution for themselves and their family. There may also be non-monetary resources that universities could make available to support ECFF, such as free financial education to help faculty understand their retirement investment options and opportunities for financial savings as financial literacy would greatly benefit ECFF (Benartzi and Thaler, 2007). Increased institutional support for caregivers should factor into the conversation across all domains because neglecting this issue for years contributed to the gender inequities exposed by the pandemic. Productivity across all domains of clinic, research and education is benefited by flexible policies and supportive infrastructure for all faculty.

3.5. Work-life well-being

Many programs have been developed to address concerns of burnout, anxiety and stress induced by the pandemic (Greenberg et al., 2020; Miotto et al., 2020). These programs must balance relieving stress for participants while not adding to work burden. It will be important for programs designed to address faculty or clinician burnout to evaluate the efficacy of intervention strategies, particularly for ECFF. One approach implemented at UMN that may help ECFF cope with stress is called "battle buddies" (Albott et al., 2020). This approach has been utilized to promote resilience in military settings and more recently during COVID-19 with front-line workers. A front-line worker is paired with a behavioral medicine provider to debrief on a regular basis (e.g., daily, weekly) in order to process the stress brought on by a critical incident. This program could be expanded to assist more than just front-line providers and across multiple domains to promote equity, support mental health and work-life well-being. Outside of the context of a crisis, such a peer support system might be called "balance buddies" or "equity buddies", providing social support for sustained career-related stress. In tandem with the aforementioned professionally-focused approach, programming designed to help ECFF and their families navigate WFC and cope with stress may be broadly beneficial in addition to financial policies to support care-givers as described above.

For some individuals, the expansion of telehealth has created work flexibility providing another opportunity to support work-life well-being for clinical faculty in certain clinical specialties. Addressing institutional barriers such as broadening patient access, reimbursement, and technology updates will support continued growth of telehealth. Adapting to a new platform also offered providers an opportunity to get creative with service in some cases, and many patients saw a direct benefit. Telehealth has also expanded the patient base for providers, particularly in specialty areas with provider shortages. Leveraging telehealth will be important for academic health systems moving forward, and ECFF may be ideally suited to contribute their knowledge of potential benefits and difficulties associated with telehealth from their time spent on the front lines during COVID-19.

4. Diversity, equity, and inclusion (DEI) framework guiding this work and evaluation/metrics to sustain this work

The model guiding our work is adapted from the DEI Framework developed by the Center for Strategic Diversity and Social Leadership (Williams, 2020) and a faculty competency framework (University of Minnesota Medical School Office of Faculty Affairs, 2021) set forth by our own OFA. By integrating these two frameworks it allowed for DEI issues to be thoughtfully overlaid on faculty competencies that will be useful for all faculty going forward. Our framework depicts action steps in a unidirectional outer circle with each step or theme supporting the effectiveness of the others. This framework is meant to be used in an ongoing, iterative and cyclical process of decision-making. Starting at the top of the circle, it is imperative to *listen to and engage diverse community perspectives.* When plans are being developed, both under normal circumstances and especially in the midst of a crisis, it is critical to *communicate thoughtfully and inclusively,* maintaining transparency and accountability at all levels. The goal is to actively reduce systemic barriers, in effect clearing the path to create a safe and inclusive space that provides equitable opportunities and *invests in [our] diverse communities,* including early-career women faculty. Lastly, *making culturally relevant and responsive decisions* is based on considering the DEI impacts of each decision at every stage by building diverse teams and relying on empirical evidence and this iterative process to calibrate the response(s) to the situation at hand. The inner circle contains seven professional competencies deemed essential for faculty success: leadership, professionalism, well-being, community engagement, teaching, clinical care, and translational research and scholarship. Taking this DEI-informed framework when considering impacts on each competency domain may help ensure ECFFs are represented in determining metrics of success in the long term. While this framework informed the recommendations presented in this paper, it was developed to be used going forward in the course of implementation and evaluation of these recommendations. Quantitative methods for evaluating faculty success based on a competency framework can be developed, implemented (self-assessment and external review), and compared to traditional metrics.

In addition to applying this DEI framework to guide evaluation, it is important to consider pairing this approach with other evaluation activities such as an institutional or departmental baseline and follow-up assessments that can quantify engagement in DEI activities. One such example is the Diversity Engagement Survey (Person et al., 2015). Identifying metrics to measure benchmarks related to the recommendations suggested in this article (e.g., comparison of rate of advancement pre- to post-pandemic) will ensure that institutions are vigilant in making sure ECFF do not suffer even further negative outcomes of the COVID-19 pandemic. Furthermore, implementation of these best practices has the potential to increase the recruitment, retention, and recognition of a more diverse faculty body.

5. Conclusions

The COVID-19 pandemic unearthed weaknesses within our national systems' ability to rapidly respond to significant challenges. In this perspective piece we bring an often-silent voice of ECFF and their experiences in navigating the tenuous balance of academic work, financial stress, and work-life stress during the COVID-19 pandemic. Through the lens of our proposed DEI framework, we provide an analysis of existing barriers to ECFF academic success both in the short and long term. As an output of our group's work, we propose solutions and recommendations that address the tiered mission of our work: clinical, research, and education. In proposing solutions, we request utilizing a cyclical process that engages diverse community perspectives, considers culturally relevant decisions, communicates thoughtfully with a balance of hope and realism, and continues to invest in diverse communities. For example, if medical school leadership is considering how to allocate internal research funds, they could apply our model to show a commitment to the diverse perspectives of ECFF. We recommend exploring specific strategies (Table 1) aligned with specific areas of competencies under the DEI framework (Fig. 1) to advance ECFF academic success. Leadership could conduct a focus group of faculty, including ECFF and other diverse groups to identify needs and potential mechanisms to provide coverage (e.g., needs to cover staff time that

could not be used as initially intended due to COVID shut downs, funds to dedicate to resources that expired or were used elsewhere during COVID). Senior leadership may otherwise be unaware of the specific needs of diverse groups. The request for proposals could then be written with the diverse and flexible needs of ECFF in mind, with intentional funding commitments to junior faculty. Final funding decisions would consider culturally relevant factors, such as need for funds rather than seniority or publication record. Through this process we believe there is a roadmap for elevating the work of ECFF, retaining women in academic medicine, and ultimately upholding our collective mission to care for our patients, educate the next generation of learners, and advance the field of medicine.

6. Disclosures

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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