# Key factors for implementing mindfulness-based burnout interventions in surgery

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ABSTRACT

Background: Burnout and distress are widespread issues in surgical training. While effective interventions are slowly coming to light, little has been published regarding the sustainable implementation of such interventions, including the critical need to identify barriers and enablers.
Methods: Enhanced Stress Resilience Training (ESRT), a mindfulness-based cognitive intervention for surgical trainees, was delivered and studied on three separate occasions. For each, focus groups, field notes, surveys and interviews were collected involving leadership, administrators and participants. Thematic analysis was used in each instance, and across instances, to explore concepts and themes, which were used to identify critical influences effecting implementation.
Results: Culture (surrounding the intervention), infrastructure (supporting the intervention) and adaptability (of the intervention) were repeatedly critical influences, guiding iterative adaptation of the intervention, and resulting in sustainability across groups and over time.
Conclusions: Identifying critical influences on intervention feasibility and acceptability can guide intervention refinement and shift sustainable implementation barriers to become enablers, as was the case at our institution. This approach may be useful in other settings.

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## Introduction

Burnout, a syndrome comprising emotional exhaustion, depersonalization and a perceived lack of personal efficacy,[1,2] is strongly associated with worse physician performance,[3–5] patient outcomes,[5,6] and hospital economics.[7–9] Physicians experience depression and suicide at significantly higher rates than the general population[10] and the risk of mental illness and alcohol abuse[11] increases significantly when burnout is present. Growing international consensus recognizes burnout as a surrogate for poor physician wellbeing, and recognizes the antidote as depending equally on institutional, systemic and individual factors[12–15] This situation frames physician burnout as a critical issue requiring intervention and reform on multiple levels.

More than half of general surgery residents report high burnout,[16,17] associated with increased risk of depression, suicidal ideation, anxiety and alcohol abuse.[16] The presence of high stress increases such risks 2-3-fold more than the presence of high burnout, alone.[16] This is particularly striking because extensive evidence also links chronic stress to detrimental effects on learning and memory, decision making, and performance.[18–20]

In other high-performance populations, such as Marines,[21,22] police special forces,[23] and elite athletes,[24–26] culturally tailored mindfulness-based interventions (MBIs) have been shown to improve stress-coping skills,[21,27,28] executive function,[29–32] and performance.[33,34] This supports the potential for a tailored MBI to benefit surgeons in a similar fashion.

In response, we developed a tailored and optimized curriculum for surgeons, Enhanced Stress Resilience Training (ESRT), which is a derivative of Mindfulness-Based Stress Reduction (MBSR), the most scientifically vetted MBI, to date. The first iteration of ESRT was found feasible and acceptable in surgery interns,[35] and preliminary evidence of efficacy soon followed.[36] Nevertheless, while such success endorsed ESRT, it did not guarantee reproduction or stability. In fact, the time-compressed, high stakes environment of surgical training required that we continually seek feedback

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(through interviews, focus groups, open-ended questions and field observations), to understand barriers to sustainable adoption. By iteratively refining and adapting ESRT in response to identified barriers, these influences became enablers. This supported stable adoption within our residency program and dissemination to other departments and institutions.

Our goal here is to share our process of identifying critical barriers and enablers, our approach to responsive adaptation of the intervention, and our higher-level evaluation across multiple iterations to find which influences/adaptations were most critical to sustainability.

## Methods

### Design

Using a thematic approach, we analyzed data from three different studies of ESRT: Study 1 (n = 40) was a pilot parallel group randomized trial (NCT#03141190) in PGY-1 surgery residents enrolled in two waves over a 2-year period with 1:1 allocation to ESRT version 1 versus an active control. Study 2 (n = 20) was a cohort study of mixed level general surgery and urology residents who received ESRT version 2a. Study 3 (n = 41) was a parallel group randomized controlled trial (NCT#03518359) in surgery and non-surgery PGY-1s with 1:1 allocation to ESRT version 2 b versus an active control (for surgery) or training-as-usual (for non-surgery). The qualitative data presented here were taken only from intervention participants: n = 22 in Study 1, n = 20 in Study 2 and n = 22 in Study 3 (Table 1).

In all studies, eligible participants were physician trainees at our institution who did not have a current mindfulness meditation practice, who provided informed consent. In Study 1 and 3, participants were volunteers randomized (blocked for gender and specialty) and partially blinded as to assignment.[35] For Study 2, participants were assigned to attend training by their residency program directors. Any participants who voluntarily attended the retreat received a $50 restaurant gift card. Otherwise, they received no other financial compensation. All aspects of the intervention and assessment were approved after expedited review by the UCSF IRB.

### ESRT intervention

All intervention classes were taught on the UCSF campus by the same professional MBSR instructor.[36] Sessions were held in classroom space, during variably-protected time (discussed below) within trainees structured 80-h work-week.

All versions of ESRT were derived from MBSR, with certain principles, elements and activities maintained across versions, described elsewhere.[36] Iterative changes include class number and length, retreat format, amount and type of home practice, and the streamlined tailoring of class content (Table 2).

### Measures

Interviews involved a semi-structured script (Table 3), which was used to elicit opinions of perceived need, impact, cost, benefit, and potential hurdles regarding the implementation of ESRT. Interviews involved field notes rather than recordings, based on interviewee preference.

Focus Groups were 2–3 h in length and involved a list of prompts and open-ended questions (Table 3) regarding perceived need, benefit, facilitators, and potential hurdles to participating in ESRT.

Field Notes were taken during each class, in all studies, assessing intervention participants through direct observation of engagement, participation and responses to in-class discussion.

Narratives were collected post-intervention from open-ended surveys given to participants, soliciting feedback on specific aspects of the intervention (content and delivery) as well as subjective self-report of experience.

### Procedures

C.L. conducted interviews with leadership and administrators before and after intervention in all three studies. Study 1 interviews involved eight Chairs and Program Directors and five administrators. Study 2 interviews involved two Program Directors and two primary administrators. Study 3 interviews involved four Program Directors. C.L. and P.O. or E.G. led focus group discussions that were audio recorded and transcribed by trained study staff. C. L. checked transcripts against recordings. For Study 1, eight senior residents participated in a pre-intervention focus group. For all studies, intervention participants attended post-intervention focus groups in the form of debriefing dinners. For each study, data from transcripts, field notes, survey responses and narrative feedback was organized by source type and compiled into an Excel spreadsheet.

### Analysis

At the completion of each study, data from field notes, narratives, interviews and focus group transcripts were compiled into a spreadsheet and read by two independent reviewers for general themes. Inductive and deductive coding schemes were applied, using blended analytic methodology,[37] with the deductive coding framework derived from grounded theory analysis in the pilot feasibility study.[35] This method allows capturing of theoretically or

**Table 1**
Study characteristics.

| Variable | Study 1 | Study 2 | Study 3 |
|---|---|---|---|
| Study design | RCT | Cohort | RCT |
| ESRT version | modMBSR/ESRT v.1 | ESRT v.2a | ESRT v.2 b |
| Class structure | 8 weeks, 2 h/week, hike retreat | 6 weeks, 1.5 h/week, hike retreat | 6 weeks, 1.5 h/week, hike retreat |
| N (intervention only) | 22 | 20 | 22 |
| Female, n (%) | 8 (36) | 13 (65) | 11 (50) |
| Caucasian, n (%) | 15 (68) | 12 (60) | 16 (73) |
| Trainee specialty | Surgery | Surgery | Surgery EM FP OBGYN |
| Trainee level | PGY-1s | PGY1-5s and lab residents | PGY-1s |
| Designated protected time | 100% | 100% | 100% |
| Service duties covered (during class) | Yes | No | Yes |
| Enrollment | Volunteer | Assigned | Volunteer |

EM = Emergency Medicine; ESERT = Enhanced Stress Resilience Training; FP = Family Practice; MBSR = Mindfulness Based Stress Reduction; OBGyn = Obstetrics and Gynecology; RCT = randomized controlled trial.

**Table 2**
Practical and conceptual differences between ESRT-1[a] and ESRT-2[b].

| Modification | Traditional MBSR | ESRT -1[a] | Purpose of Modification | ESRT-2[b] | Purpose of Modification |
|---|---|---|---|---|---|
| **Practical** | | | | | |
| Class number | 9wk: Intro session +8wks | 8 wk: Intro + Wk 1 combined | (L) 8wk summer gap in didactics | 6 wk: Intro + Wk 1 combined | (C) Minimize clinical disruption |
| Class duration | 2.5 h: experiential, inquiry-based, breaks, didactics, metaphors | 2 h: experiential, explicit, focused discussions and didactics, no break | (L) Protected time, preserve 80 h work-week, educational and OR time | 1.5 h: experiential, explicit, non-inquiry, 5min intellectual content, handouts | (L, C) Better scheduling, more acceptable, more accessible |
| Retreat | 8 h silent retreat, meditation center | 2–3 h: 'Medi Hike', nature preserve | (C) Request for fresh air and exercise | No change | Strong positive feedback |
| Assigned daily practice time | 45 min daily | 20 min daily formal practice | (C) 20min effective in others, responsive to time-compressed surgical lifestyle | 20min ideal, goal is consistency, informal practice o.k. | (C) 'Failing' at 20 min, added to participant stress |
| **Conceptual** | | | | | |
| Class content | 1.5 h: Meditation 1 h: breaks, sharing, didactics, Inquiry-based | 1.5 h: Meditation 30min: shortened didactics, no break, limited sharing | (L) Preserve experiential focus, shorten class time | 1 h: meditation 30min: explicit concepts, not inquiry based | (C) Capitalize on culture of skills training, fast learners |
| Emphasis | Insight, life-long learning about self, world. Enhances health broadly. | Skill set for stress resilience, in general. | (C) Application to life, relationships, training, career longevity. | Resilience skill set, specific work application, conceptual scaffold | (C) Growing distress and burnout, modeling ESRT in work, life. |
| Contextualization | Broader application of concepts and skills to all interactions | Application to personal and professional situations | (C) Skills applied to surgeons' life and work | Emphasize applied techniques, all day, various scenarios | (C) Explicit skills for explicit situations, need for modeling |
| Expectation | Committed formal practice goal | Daily practice mostly formal, less informal | (C) Reinforce 'some is better than none at all'. | Train formally, but 'Live your practice'. Informal practice, anywhere, all day | (C) Capitalize on natural tendency for discipline, repetition and ritual |

(L) = logistical modification, (C) = cultural modification.
[a] ESRT-1 = 8 weekly, 2-h classes.
[b] ESRT-2 = 6 weekly, 90-min classes.

clinically important themes as well as unanticipated themes that emerge. Resultant codes were reviewed by three people (C.L. and P·O., A.D., A.H., or E.G.) and discussed for consensus by the group. Through iterative group discussion, similar codes were aligned and concepts and themes were extracted. Confirmatory evaluation occurred in discussion with surgeons (C.L., N.A., H·H), experts in the field of MBIs, and a professional clinical research coordinator (E.G.), to address potential bias.[38–40] Identified concepts and themes were used to guide intervention adaptations (e.g., specific language and emphasis, timing and length of sessions), which were applied in the subsequent study. This process was done iteratively: executing, evaluating, adapting, and executing again.

After the conclusion of Study 3, three years after ESRT was first introduced, we recognized several new developments that signaled a change in the potential sustainability of ESRT at our institution. Namely, that ESRT had become an expected annual course; that ESRT programming was now highlighted in presentations to prospective residency applicants; that surgical faculty had begun to request and receive ESRT training; and that other departments and institutions had begun to request ESRT training, as well. This prompted us to look for what factors might have motivated these developments. We compared frequently recurring codes and themes across studies,[41] exploring their influence on sustainability,

and mapping them[42] to relevant constructs and domains drawn from the Consolidated Framework for Implementation Research (CFIR). The CFIR is a widely-used construct which facilitates formative evaluation of implementation processes.[43,44] This approach is consistent with implementation research, which naturally examines multiple, separate inputs (from documents, observations and interviews), across different cohorts, to derive a picture of not only *what* works, but also *where* and *why*.

## Results

### Identifying influence

In all three studies, 27 consistent and recurrent codes were identified (from 30 pages of qualitative data, 10-point font, for all three studies together). Study 2 had more frequent conflict codes than data from the other two studies. Comparison of recurrent codes across studies revealed three major themes: culture, infrastructure and adaptability. Sub-themes were operationalized as a means of describing a process scaffold and action steps.

**Culture**: Culture was defined as comprising those elements, inside and outside of stakeholders, that influence their opinions and feelings about the ESRT curriculum and its implementation.

**Table 3**
Semi-structured interview and focus group prompts.

| Question Prompts for Interviews with leadership/administrators | Question Prompts for Focus Group with senior residents | Question Prompts for Focus Group with participants: |
|---|---|---|
| Do you think we need some kind of intervention (for well-being or stress)? | When you think of mindfulness-based training, what ideas or opinions come to mind? | How did ESRT affect you, or not? What stands out as good? As bad, or needing improvement? |
| Do you think cognitive training is a reasonable choice? | Do you think there's a need for an intervention of some kind? | What changes have you seen in residents, culture, or practice that you think could be related to the ESRT program? Which are good, and why? Which are bad, or concerning? |
| What barriers or issues do you perceive regarding cognitive training at our institution? | What benefit or circumstance would make participating in an intervention like this seem worthwhile? Valuable? Interesting? | Do you think something like ESRT is still needed? Should it be expanded? Replaced? |

These included misperceptions regarding the value of ESRT for surgeons, limited awareness of the evidence supporting MBI effectiveness, and perceived conflict between well-being interventions and surgical ethos and identity.

Three sub-themes emerged as critical to establishing a culture that facilitates ESRT implementation: *Establishing Value, Knowledge of Evidence, and Personal Experience*, exemplified by quotes (Table 4).

We operationalized the sub-theme of *Establishing Value* as the pursuit of shared understanding between stakeholders and curriculum developers regarding needs and priorities. This underscores the importance of aligning intervention value with stakeholders needs, and demonstrating value in terms that are meaningful to stakeholders at all levels. We operationalized *Knowledge of Evidence* as the product of actively disseminating pertinent knowledge about the intervention, the evidence base, and examples of successful implementation in similar populations, potentially in a recursive way. We operationalized *Personal Experience* as stakeholders' direct exposure to the intervention (as a participant) as well as secondary exposure through peers and contacts.

We addressed cultural barriers by focusing on quantitative outcome measures that were meaningful to stakeholders, by crafting grand rounds presentations and elevator talks that specifically targeted the MBI evidence base, and by early beta-testing of ESRT among thought- and opinion-leaders in our department. This process transformed value, evidence and experience into enabling influences.

**Infrastructure**: Infrastructure was defined as those elements involved in creating or resolving logistical conflict. These included the scheduling demands of adding new curricula, logistical complexities in facilitating attendance, and social nuances involved in enabling genuine participation. Three sub-themes emerged: Time, Protection (from pagers and duties), and Allowance (the absence of judgement, retribution or resentment for attending class), exemplified by quotes (Table 4).

We operationalized *Time* as pressures and constructs influencing the timing, frequency and duration of ESRT classes. Some of

**Table 4**
Major themes, sub-themes, practicable steps and exemplary quotes.

| Major Themes | Sub-Themes | Operationalized/Practical Steps | Quote |
|---|---|---|---|
| Culture (Stakeholders) | Establishing Value | Eliciting and understanding shared needs and priorities (interviews, focus groups) | We know we're delivering excellent surgeons. But I worry they're not nice to work with colleagues? They do an excellent job … I don't hear much about distress, but hear about personalities, poor professionalism. (I1) I know we need something like this but making it formal, training time is difficult. The ACGME just changed our requirements for Interns. Meeting requirements must come first. (I2) |
| | Knowledge of Evidence | Disseminating evidence through extensive grand rounds, in multiple iterations | We're a group that's very interested in math, science, fact, black and white, what we can and can't see or feel tangibly, and see the evidence for, and this is a lot more about feelings and emotions that's a lot harder to quantify or even discuss. (FG1) |
| | Personal Experience | Exposure through iterative beta testing in residents and faculty. Targeting thought-leaders for early exposure. | Going in, I didn't have high hopes that this mental training could work, but now I'm a strong believer. I don't know if mental training actually reduced my stress or not, but those 8 weeks changed my perspective on things. I'm able to incorporate it throughout my day at the hospital in so many different settings, allowing me to deal with stressful situations/encounters. It's also been nice to come home and meditate after a long day. It puts my mind at ease. I think there are so many subjective gains from this experience, that even if objectively the data is not significant, I would still recommend it and push for it. (RP1-N) |
| Infrastructure (Conflicts) | Time | Encompassing sessions within duty hours, using educational days, summer hiatus from grand rounds | We have to be very careful of duty hours. If we're asking them to do this, then it can't add to the time they are at work. It must be within the 80 hours (I3) |
| | Service Coverage | Protection from pagers and duties (strategic planning of class time, coordinating with rotation schedules, night call), providing moonlighters/alternative coverage where necessary | I ended up missing a lot of didactics and presentations, which actually ended up making me feel more stressed on Wednesdays [protected time for didactics]. (RP2-N) |
| | Allowance | Ensure respect vs. retribution or recrimination by developing strong leadership support, advertising support | The department says they want us to participate but when we return to clinical duties there seems to be underlying resentment. (RP3-N) |
| Adaptability (Variability) | Identification | Address personal and professional identities through modified language, streamlined delivery and tailored content | You have to be so stoic and you can't really show much emotion, and in some aspects of it you have to be a source of strength. (FG2) |
| | Practicality | Modify content and expectations in response to real life constraints and demands (recognizing effort, emphasizing value of personal adaptation) | Since mental training, I have been more in touch with how I'm feeling at any given time. In the OR, I am aware when I am feeling tense and am better able to control my breathing and stress level. (RP4-N) |
| | Relevance | Tailoring and contextualization of training elements | I found that my breath is a tool to ground myself in many situations and therefore I feel that I can trust myself more. In intern year … we always find ourselves in the situations we have never been before. It brings me back to myself, I can trust myself again. (RP5-FG) I tend to spiral in my mind when I stress out. Now I take time to recognize it. It is ok to be with uncomfortableness. I breathe and pause and it's just a feeling. [This especially] helps when learning new procedures. (RP6-FN) |

I=Interview participant (i.e., leadership or administration), FG=Focus group participant, RP = Resident (intervention) Participant, N=Narrative, FN=Field Notes.

these are immutable (like the 80-h limit) and others were malleable (like an established schedule of resident education days, or seasonal variation in grand rounds programming). We operationalized *Service Coverage* as factors facilitating physical engagement in the intervention, such as protected time from clinical responsibilities, or scheduling of overnight call. We operationalized *Allowance* as the presence or absence of respect, retribution or recrimination for intervention participants, recognizing the potency of leadership in influencing prevailing attitudes.

We addressed infrastructural barriers through multiple strategic planning meetings with managers and site directors, clarifying fixed boundaries and eliciting scheduling possibilities. This identified established educational days and natural lulls in the academic year as ideal times for providing ESRT, and minimized service-coverage conflicts by avoiding night call and intern-dependent rotations for ESRT participants. Minimizing conflicts in this manner increased leadership support and decreased peer disapproval, transforming timing, coverage and allowance into ESRT enablers.

**Adaptability:** Adaptability was defined as variations affecting the feasibility and acceptability of the intervention. Three sub-themes emerged: Identification, Practicality and Relevance, exemplified by quotes (Table 4).

We operationalized *Identification* as personal and professional expectations of appearance and behavior that influence receptivity and affinity. These expectations were reflected in, or absent from, language, content and delivery of the intervention. We operationalized *Practicality* as the intervention's ability to be modified to reflect the realities of the target population's character and constraints. Finally, we operationalized the sub-theme of *Relevance* as purposeful or emergent changes to the intervention, the target population, or the environment that give the intervention place, meaning and usefulness.

We addressed adaptability barriers by modifying ESRT language (away from jargon and into lay-person terms), contextualizing the use of ESRT skills in the lives of surgeons, and including testimonials of benefit from past-participants. This facilitated identification with ESRT and cemented relevance, changing both to enablers of sustainability.

Finally, regarding practicality, we found that addressing this theme involved both content and logistics in a closely related fashion. Simply shortening MBSR might increase practicality but might also diminish its efficacy. Instead, we examined each component of traditional MBSR, looking for ways to be more explicit, direct or succinct without shortening the actual experiential training component and without diminishing the impact (Table 2).

*Influencing implementation*

While these factors were found to be consistently influential in each iteration of ESRT, their relevance to a generalizable process of sustainable implementation was unclear. To explore this, we compared our identified influential themes and sub-themes to the functional elements of the Consolidated Framework for Implementation Research (CFIR). The CFIR can be used to help translate health service research into practice by clarifying targetable factors that impact what works, where, and why across multiple contexts, guiding formative evaluation of processes aimed at facilitating implementation.[43]

We found that our influential themes and sub-themes mapped to multiple constructs recognized as impacting implementation processes in general, represented by five major domains of CFIR: intervention characteristics, outer setting, inner setting, characteristics of the individuals involved, and process of implementation (Table 5).[45]

## Discussion

Here we present the process involved in developing a sustainably implemented burnout intervention for surgical trainees. Recursive identification of intervention barriers and enablers; reiterative and responsive adaptation of the intervention; and a higher-level evaluation of those influential elements (across multiple iterations) were essential to this process.

Regarding the identification of critical barriers and enablers, we found that the major themes of Culture, Infrastructure and Adaptability embodied the most influential factors involved in implementing ESRT. This identification was dependent upon the use of qualitative research methods (interviews, narratives, field notes and focus groups), and resulted in our ability to optimize infrastructure and adapt the intervention iteratively, shifting barrier influences to enabling influences. This simultaneously paved the way for intervention sustainability.

For example, field notes and narratives revealed more frequent conflict codes in Study 2, derived from senior resident data. We discovered that the allocated "protected time" for this class (mandatory for a certain group of resident participants) involved *held* pages but not alternative service coverage. This resulted in senior residents encountering numerous "piled up" tasks awaiting them after class (their own and those bumped up from interns and juniors also attending class). Additionally, they encountered the ire of impatient nurses and attendings. This resulted in a dissonant experience for them, being required to attend a class and being resented for doing so. This clarified that protection must include true service coverage in addition to buy-in from colleagues, predicated on careful advance scheduling, caution regarding all residents participating at once, and the cultivation of support (from all levels) which was easier to obtain with a shorter class.

The potential for generalizing this process is supported by the clear mapping of our influential themes and sub-themes to the widely-accepted influential domains and constructs of the CFIR. This indicates that the factors identified here are indeed elements of sustainable implementation (within our unique setting) and suggest that *a priori* targeting of similar elements in other academic surgical settings may facilitate the sustainable implementation of similar interventions, elsewhere.

In further reflecting on our findings, we were struck by the critical need for a recursive, iterative process in order to establish sustainability. Although the same themes and subthemes were found to be influential for each study iteration, they evolved (from being inhibitors to being facilitators, or in the magnitude of their impact). They never lost relevance and persisted in having complex feed-back interactions with one another.

This underscores that efforts at culture change and behavioral interventions, especially in the complex environment of graduate medical education, should be expected to require iterative and feedback-oriented processes of development.[46–50]

Not surprisingly, this study revealed several inherent logistical and cultural factors that naturally and robustly facilitated the adoption of ESRT within surgery. For instance, a natural desire for self-improvement, comfort with disciplined practice, and an affinity for skills-based learning made the cognitive training aspect of ESRT engaging. Also, surgeons' firm commitment to putting patients first was a powerful motivator for ESRT when the association between physician self-care and better patient care was highlighted.

Finally, this study is limited in that an implementation framework was not used in designing our assessments or in initially gathering our data.[51,52] While similar qualitative methods were employed, *a priori* framing aimed at long-term implementation would certainly have been beneficial and is a recommended step

**Table 5**
Mapping of influential factors to CFIR constructs and domains.

| Influential Factors | | Consolidated Framework for Implementation Research (CFIR) | |
|---|---|---|---|
| Theme | Sub-Theme | CFIR Construct | CFIR Domain |
| Culture | Establishing value | Intervention source | Intervention characteristics |
| | | Design quality and packaging | Outer setting |
| | | Cost | Inner setting |
| | | Patient needs and resources | Characteristics of individuals |
| | | Culture | Process of implementation |
| | | Implementation climate | |
| | | Planning | |
| | | Reflecting and evaluating | |
| | Knowledge of evidence | Evidence strength and quality | |
| | | Networks and communications | |
| | | Knowledge/beliefs about intervention | |
| | Personal experience | Relative advantage | |
| | | Trialability | |
| | | Peer pressure | |
| | | Culture, Self-efficacy/Stage of change | |
| | | Knowledge/beliefs about intervention | |
| | | Engaging | |
| Infrastructure | Time | Complexity | Intervention Characteristics |
| | | Design quality and packaging | Outer setting |
| | | Implementation climate | Inner setting |
| | | Planning, Executing | Characteristics of individuals |
| | Protection | Cost | Process of implementation |
| | | External policies and incentives | |
| | | Networks and communications | |
| | | Culture | |
| | | Implementation climate | |
| | | Planning, Reflecting and evaluating | |
| | Allowance | Cost | |
| | | Peer pressure | |
| | | Structural characteristics | |
| | | Networks and communications | |
| | | Culture | |
| | | Implementation climate | |
| | | Knowledge/beliefs about intervention | |
| Adaptability | Identification | Design quality and packaging | Intervention Characteristics |
| | | Culture, Self-efficacy | Outer setting |
| | | Knowledgee/beliefs about intervention | Inner setting |
| | | Identification with organization | Characteristics of individuals |
| | | Engaging | Process of implementation |
| | Practicality | Adaptability | |
| | | Structural characteristics | |
| | | Implementation climate | |
| | | Self-efficacy | |
| | | Planning, Executing | |
| | Relevance | Patient needs and resources | |
| | | Culture, Self-efficacy/Stage of change | |
| | | Knowledge,/beliefs about intervention | |
| | | Engaging | |

for others. Our results should be interpreted with this limitation in mind.

## Conclusion

Our results suggest that qualitative exploration of the culture, surrounding infrastructure and adaptability of burnout interventions in the GME surgical setting is essential to understanding key influential factors. This is fundamental to iteratively addressing barriers, transforming them to enablers, and obtaining successful and sustainable implementation of the intervention.

## 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.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amjsurg.2019.10.025.

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