Thinking Outside the Inbox: Use of Slack in Clinical Groups as a Collaborative Team Communication Platform

Tim Montrief, MD, MPH[1] (iD), Mary R. C. Haas, MD[2], Al'ai Alvarez, MD[3] (iD), Michael Gottlieb, MD[4] (iD), Deborah Siegal, MD, MSc[5], and Teresa Chan, MD, MHPE[6] (iD)

Academic faculty commonly collaborate across organizations located in multiple time zones, rendering in-person communication impractical. Furthermore, local access to content experts may be limited at many institutions, and multiple competing commitments may preclude attendance at relevant networking events.[1] This is especially true during public health crises such as the COVID-19 pandemic, which has accelerated the incorporation of digital alternatives into workflow.[2,3] Therefore, it is important for teams to develop easily accessible, reliable, and cloud-based collaborative tools to facilitate communication.[4] Although e-mail remains a viable option for short, intermittent communications, the time spent reading and responding to e-mails among larger teams discussing disparate topics may impair productivity.[4–6] E-mail creates multiple synchronous discussions, making it difficult for individual team members to follow and distinguish topics or projects. At academic medical centers, high volumes of e-mails risk effective team communication due to important e-mails being overlooked or inadvertently deleted.[7,8]

With the advent of Web 2.0, or the social use of the web, there has been an increasing interest in online team platforms, termed "enterprise social networks" (ESNs), which are specifically designed to assist organizations in managing productivity, improving team efficiency, disseminating institutional expertise, and supporting collaboration.[9,10] While Slack[11] is the dominant ESN, several competitors exist, each with its own unique set of features, advantages, and potential limitations. Popular examples include Basecamp,[12] Microsoft Teams,[13] and Google Hangouts Chat (Table 1).[14] ESNs differ from social network sites, such as Twitter and Facebook, which enable users to create and promote a personal brand while building a network of connections with other individual users.[15,16] ESNs are team-based platforms, providing streamlined communication channels and creating a richer knowledge-sharing environment focused on a larger series of specific projects or goals.[10]

WHAT IS SLACK?

One of the most popular ESNs is Slack, a cloud-based digital workspace and information management system that allows multiple users to collaborate on group projects in real time.[4] Slack is modeled on the familiar instant messaging structure that allows for a more natural back-and-forth interaction when compared to e-

Table 1
Most Common Enterprise Social Network Platforms[39]

Feature	Slack	Basecamp	Microsoft Teams	Google Hangouts Chat
Messaging	Single-person direct message, group direct message, open channels, closed channels	Single-person direct message, group direct message, open channels, closed channels	Single-person direct message, group direct message, open channels, closed channels	Single-person direct message, group direct message, open channels, closed channels
Message history	10,000 searchable message history on free; unlimited on paid	Unlimited searchable message history for all tiers	Unlimited searchable message history for all tiers	Not specified
Voice/video calls	One-on-one for free, up to 15 participants on paid	Audio and video calls are not supported	Meetings with up to 250 participants on all tiers	Up to 25 on basic tier, up to 50 on highest tiers
Record meetings	No native capability, but available through third-party integrations	No native capability	Available on paid tiers	Available on all tiers
Screen sharing	None on free, only on paid	No native capability	Available on all tiers	Available on all tiers
Integrations	10 integrations on free, unlimited integrations on paid	Unlimited integrations on all tiers, but less integrations offered compared to competitors	Unlimited integrations on all tiers, but less integrations offered compared to competitors	Unlimited integrations on all tiers, but less integrations offered compared to competitors
File storage limits	5GB total on free 10GB per user on mid-tier 20GB per user on highest tier	1GB total on free 500GB per team on paid	2GB per user + 10GB shared on free 1TB per user on paid tiers	30GB per user on basic tier Unlimited storage on highest tiers
Guest users	None on free, only on paid	None on free, only on paid	Available on all tiers	No native capability
Exportable messages	Can be exported by admins on most expensive tier	Can be exported by admins	Can be exported by admins	Can be exported by admins
Support	24/7 support and 4-hr response	Limited on free, priority support on paid	$20 per month for 24/7 support	24/7 support for all tiers
Platform availability	Windows, macOS, Linux, iOS, Android, Web client	Windows, macOS, Linux, iOS, Android, Web client	Windows, macOS, iOS, Android, Web client	Windows, macOS, Linux, iOS, Android, Web client
Core differences	Centered around team communication Significantly more third-party app integrations	Centered around project management, with to-do lists, schedules, and progress reports	More native features, admin control, security compliance, and integrates with Outlook services	Not a full-fledged platform, but integrates with the rest of Google's products

mail.[17] Integrated voice or video calls within Slack also allow users to conference and share screens in real time. Conversations between members typically occur in channels that can be organized by topic, project, team, or interest. This creates a communal place for storing information and working on projects.[4] Members can communicate with each other individually via direct messages or publicly in their respective channels. Real-time and asynchronous communication allows users to participate in active discussions and to catch up on team conversations they may have missed. In addition to messaging, Slack provides the ability to archive, search, and share files among team members. A unique feature of Slack is its robust searchability, because all files and messages posted in a group's channels are searchable. Slack offers several levels of service, including a free basic option and upgraded tiers.[4] Additional information about the different features and pricing is available on the Slack website.

Slack has been successfully used by many collaborative groups in a variety of settings, including undergraduate medical education,[17] graduate medical education,[18] course communication,[19] conference discussions,[20] clinician wellness[21] and coordination of institutional research.[22] In one survey of users conducted by Slack, 32% of respondents agreed that Slack increased team productivity, with a decrease in team meetings by over 25% and intranetwork e-mails by over 48%.[23] Nearly 80% of survey respondents felt that Slack enriched their team culture, with 88.6% feeling more connected to their teams.[23] Over 80% of users endorsed improved transparency within their teams, with 62.4% responding that Slack made it easier for them to locate relevant project information.[23] One online collaborative network, Academic Life in Emergency Medicine (ALiEM) has successfully utilized Slack since its debut to significantly augment the team's academic productivity.[1,24–26] The authors

have experience using Slack for a variety of projects across multiple disciplines. In this article, we focus on integrating this collaborative online team platform for clinical groups.

HOW SLACK MIGHT WORK WITHIN MEDICINE AND HEALTH CARE

Online platforms, such as Slack, can be utilized for academic productivity in research and curriculum development, as well as providing an added level of engagement among educators and learners.[24,27,28] This can also be valuable for creating virtual communities of practice to promote innovation and development of mentorship and mastermind groups.[26] Slack also allows for streamlining of high-stakes communication that is searchable and archivable, including clinical operations communication, such as creating guidelines and protocols. Table 2 provides specific examples of how these ESNs can optimize collaboration among teams working in a broad range of areas including clinical operations, research, and medical education.

TIPS FOR SUCCESSFUL SLACK UTILIZATION

The following section contains tips for engaging in effective Slack communication. These are best practices derived from our experience using multiple Slack channels for carrying out projects[29–31] and running educational programs (e.g., chief resident incubator, faculty incubator).[24,25]

Tip 1: Setting Up for Success—Suggestions for Onboarding Your Team to Slack

Onboarding is important in many sectors.[32,33] When transitioning teams from real-life to digital interactions, it can be helpful to incorporate onboarding as well. Components to consider when onboarding include:

1. Assisting individuals with technology—When setting up online spaces, ensuring on-demand assistance for installing apps or asking questions about how to access resources is important. A screencast or in-person session about how to use Slack can help people get set up. For instance, encouraging members to download the apps for their computers and mobile devices with instructions can be important.
2. Orienting individuals to the online space—Creating and posting a robust set of instructions for describing the online space helps direct members to the features available in Slack. This includes directions for creating a profile, adding a photo, or joining optional channels (see Figure 1 with a screen capture of one possible onboarding channel orientation script).
3. Socialization—Establishing ground rules is imperative for any work environment, and Slack is no different. The same social rules that exist in real life may not resonate for those who are not used to conducting themselves online via text-based media. Explaining (and role modelling early) the use of niceties or emojis may be highly relevant when interacting in this format.

Tip 2: Forming a Team of Slack Champions

Enlisting the help of individuals with experience using Slack is important for transitioning team members to a new teamwork paradigm. As leadership expert Kotter[34] points out, change management processes benefit from a *guiding coalition* that helps foster a successful transition. This group of people acts as the center group of a virtual community of practice for using Slack.[27,31,35] No one person can be online at all times, so enlisting a team ensures there is adequate coverage by experienced individuals. Members of this group can be deputized to help with the socialization of new members (e.g., greeting them as they arrive and being a friendly "host" to touch base if they have questions) and function more as moderators initially. Granting these individuals Slack administrative powers (i.e., making them an "admin" type of member within the workspace) will allow them to monitor channels to ensure members uphold the principles of inclusivity and respect.

Having multiple champions can be important because previous literature about online communities suggests that moderators are important for ensuring professionalism.[36] Gentle nudges and bystander interventions can help prevent miscommunication or to cut tensions that exist in text-based communications.

Tip 3: Organizing Your Workspace

One of the key elements of running an effective Slack workspace is to set it up properly. This is actually the first step for using Slack. Before sending invitations to join the group, set up all the channels required by the team to be successful. This will reduce the likelihood that many channels will be added by individual team members. Consider the organization's most common activities (e.g., shift trades, COVID-19

Table 2
Slack Applications in the Health Care Sector

| Application Domain	Example	Provisos or Pitfalls for This Application
Clinical/ Operations: Process Improvement	The COVID-19 pandemic created unprecedented challenges requiring adaptability and vigilance. Slack streamlines creation and dissemination of protocols and guidelines without inundating members with individual texts, e-mails, and meetings.	It is important to simplify communication using one platform and minimize alternative modes of communication in order to focus the attention and collaboration.
Clinical/ Operations: Physician Group Communication	Given the complex nature of running a department along with various sections, divisions, and team leads, this could be used to develop a system of communication that is recorded, searchable, and reaches the span of the entire physician group without overwhelming traditional e-mail boxes and voicemails. Slack offers synchronous and asynchronous back-and-forth discussion among key stakeholders.	While critical information may be disseminated via Slack, the expansive multiple dialogues may be overwhelming to those who are not in decision-making roles. After every constructive conflict or discussion, team leaders should summarize points and final decisions.
Clinical/ Operations: Supply Chain	Departments who are more comfortable with Slack have expanded to interdepartmental collaborations to include supply chain representatives and nursing leadership to communicate needs, updates, and requisitions.	While communication on Slack may be comprehensive, translating this into formal memoranda may be needed for transactions and sales as well as development of protocols and guidelines easily accessible for many not part of Slack.
Research	Research collaboration, including the creation of this manuscript, has been made possible through communications via Slack. Several others have shown success using this medium.[22,40]	Differences in routine checking of Slack messages may impede progression of a project. Augmenting the workflow with cloud-based document sharing such as Google Docs may help overcome this pitfall as well as tagging participants that may lead to a user-directed e-mail announcement.
Education: Curriculum Development	Given the requirement for providing Individualized Interactive Instruction in EM per the Accreditation Council for Graduate Medical Education (ACGME) Residency Review Committee for Emergency Medicine (RRC-EM), Slack offers the opportunity to facilitate virtual small group instructions.[18,41]	Push notifications from learners may be overwhelming for faculty and vice versa. Developing a routine and setting notification preferences may address this challenge.
Education: Program Leadership Communication	To minimize e-mails, text messaging, and phone calls, the Stanford EM residency program director leadership team switched to using Slack. Each of the assistant program directors have channels for their domains (e.g., recruitment, accreditation, assessment, curriculum). Updates and issues in each of these domains are now tackled via Slack.	Appraising the chief residents or other key stakeholders not part of the program leadership channels requires deliberate effort. It is important to hold regular in-person meetings for updates and for hearing other stakeholders' perspectives.
Education: Back Channel for Live Cast Lectures	The ALiEM group launched the first-ever massive online interactive conference in response to the coronavirus pandemic in an effort to provide didactic education to EM residency programs across the country.[3] The logistics of creating an engaging and interactive platform challenged the traditional method of using the Zoom platform. Using Slack, individual residency program channels were created to provide site-specific discussions as well as speaker-channels to allow for direct level of engagement with national experts.[29]	Discussions from >1,000 registered participants may be daunting to sift through during the live conference. Creating speaker-specific channels and assigning dedicated back channel moderators allowed for real-time engagement via question and answer format.
Education: Medical Education Engagements	Libraries communicate directly with medical students using Slack.[17]	Buy-in may be variable, and some students may opt to disengage. These students then will be left out from further communications within the institution.
Continuing Professional Development: Creation of Virtual Communities of Practice	The ALiEM Faculty Incubator: provides a novel online approach to faculty development in education scholarship.[24]	Variable engagements and individual time pressures of faculty may affect productivity especially with the integration of online responsibilities to current work and life obligations.
Continuing Professional Development: Mentorship/ Mastermind Groups	As with virtual communities of practice, developing mentorship and mastermind groups are easily facilitated by Slack.[24,26] Other high-performance teams that utilize Slack include Mission Critical Teams Institute[42] and Arena Labs[43]	Successful collaborations and mentorship relationships require agreement of goals and responsibilities. Clarifying this at the initiation of the relationship is key.

#1-start-here

☆ | 👤 63 | 🔖 0 | ✎ Add a topic

📞 ⓘ ⚙

───────────── **November 30th, 2019** ─────────────

PFD Admin 5:48 PM

Welcome to the Program for Faculty Development Slack account. This will act as our central hub of communications. A few pro-tips as you get started.

1. Remember to install the apps on your desktop and/or your phone (but turn off notifications!) as this will be a great way to stay in touch and collaborate with your PFD teams!
2. Head over to #announcements to introduce yourself to everyone.
3. Join the channels that work for you, full listing is below. Simply click on the "#" link below and it'll take you to the relevant channel. Then you can JOIN the channel, and begin conversing there.
4. This video introduces you to slack. Check it out!

https://vimeo.com/214259640 (edited)
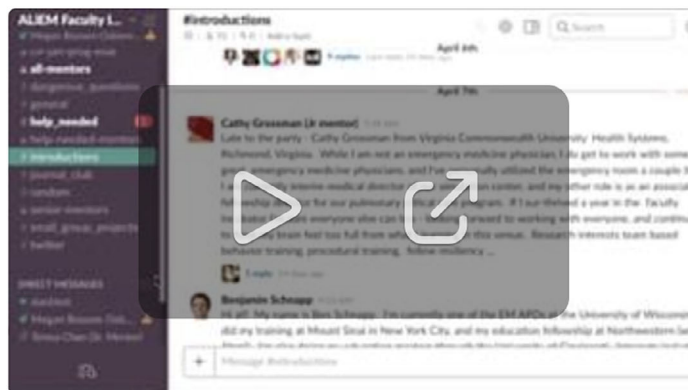
PFD Admin 6:02 PM

Find the rest of your team at these channels:

Pillar teams:

#teachingsupervision

#leadership-mgt

#scholarlypractice

#humanism-creativity

Figure 1. Slack onboarding channel orientation script. References: Boysen-Osborn M. Slack for Faculty Incubator Video. Vimeo. Available at: https://vimeo.com/21425940.

protocol developments) and create channels for these topics. Then, create a default channel that is titled #1-start-here (as shown in Figure 1); as individuals join, they should be directed to this channel in the invitation e-mail so that they can learn about the code of conduct and expectations. By creating an iterative list of available channels and updating the onboarding message, new members are oriented to available resources.

Tip 4: Communicating Effectively in Slack Requires Understanding Your Options

One of the unique features of Slack is the ability to utilize multiple communication avenues simultaneously. Group members should utilize these to ensure efficient conversation and avoid overwhelming a conversation with multiple disparate thoughts. For example, if there was a group interested in airway management during COVID-19, they could create a

dedicated open channel, so that all interested members could join, while avoiding extensive discussion of this in the general education channel. Moreover, if a subset of this group planned to perform a quality improvement or research project on this topic, they could create a closed channel specifically for project planning. A summary of the main communication options is provided in Table 3.

Tip 5: Use a Continuous Quality Improvement Cycle to Improve Your Workspace

As with all interventions, feedback is essential.[37,38] Project and education leaders should check in with the team members to assess how the model is working. They should identify whether there is a need for further training as well as whether there are specific areas that could benefit from refinement. For example, a common error is to create too many channels with significant overlap. While having different channels is beneficial for creating focused content, having multiple similar channels can lead to several redundant conversations.

Tip 6: Go Beyond Slack to Optimize Your Communication Strategy

Remember that although Slack may be known as the "e-mail killer," e-mail or texting still exist and can be used judiciously to enhance Slack-based communications. Some team members may have difficulty adapting to the faster speed and new technology. In these cases, it may be valuable to incorporate more familiar technology (e.g., e-mail, text messages) to highlight time-sensitive or critical questions. If possible, these tools can reengage group members with Slack as opposed to replacing Slack communication. While the

goal of successful adoption of Slack is to alternative means of communication, outlining escalation of communication, e.g., messaging via Slack then text messaging then phone call creates clear expectations. If alternative means of communication is employed that could easily be discussed in Slack, a way to redirect the group is to respond using Slack. This is key especially at the beginning of the implementation phase to encourage developing of a new habit of communication.

Similarly, some users may stop utilizing Slack due to other time commitments or difficulty with tracking the conversations if the number of messages gets too large. In these cases, it is important to check in with the user and assess the reason they have stopped using it and work together to identify a solution. This could include developing strategies to build Slack into their daily schedules, adjusting notification features, or allowing them to ignore older messages and start anew with current conversations.

STRENGTHS

As with any tool, Slack has both strengths and limitations. In contrast to other communication platforms such as e-mail and text messaging, new members of a team can join a thread and see the conversation that has taken place prior to their entry. Members can also use a search tool that allows them to quickly find documents or quotes. This facilitates orienting new team members to projects. The ability to create different types of channels in Slack with different privacy settings also adds flexibility to enhance team communication; users can adjust channel settings to create invite-only private or open channels, as needed. Slack users can also easily attach and integrate files such as Word documents, PowerPoint presentations, images, and PDFs into conversations. The use of Slack can reduce the amount of e-mails received and naturally organize messages pertaining to a given project or team in a single place.

Similar to e-mail and text message platforms, users can search and archive Slack conversations for later reference. Downloading the mobile Slack app onto one's device allows it to function similarly to other text message platforms, such as WhatsApp, GroupMe, and iMessage, but with the enhanced functionality and added features of the Slack application. The ability to use Slack in a similar fashion to text messages can reduce the threshold for members of a team to

Table 3
Communication Options in Slack

Communication Option	Description
Single-person direct message	A direct conversation between two people which is separate from the large-group conversations
Group direct message	A direct conversation between several people which is separate from the large-group conversations
Open channels	A dedicated discussion area on a focused topic which any member can join
Closed channels	A dedicated discussion area on a focused topic which only invited members can join

communicate with each other and thereby enhance collaboration. For instance, users may feel more comfortable "direct messaging" another member of the team rather than calling, texting or e-mailing them. Along these lines, Slack allows for teams to generate a more informal, social experience of working together by promoting more brief, casual conversation and incorporating the use of emojis to increase engagement and levity.

While Slack is able to provide a platform for multi-institution/large groups to communicate and disseminate archivable information with asynchronous engagements, it also provides an environment that promotes connection and belongingness.[21] An example was the launch of the first-ever multiple-residency program emergency medicine virtual conference in response to the COVID-19 pandemic.[29] Over 1,000 emergency medicine learners and faculty including 64 residency programs gathered in a 2-hour session and used Slack as a backchannel discussion board. Slack-enabled synchronous discussion and brainstorming that augmented the virtual lectures. Within the larger platform, each residency program also had its own channel, which facilitated site-specific discussion relevant to the lectures. Slack provided an innovative way of connecting participants and engaging them using the gamification of medical concepts. Slack provided a platform that allowed for otherwise "quiet" learners in traditional lecture formats to be engaged and contribute.[20] During a time when physical distancing was the norm, Slack enabled learners and educators to connect and interact.

LIMITATIONS

Users of Slack also must maintain awareness of its several pitfalls and strategies to mitigate them. For one, encouraging members of a team to download and begin using Slack can generate frustration and contribute to the perceived burden of staying up to date with other existing communication modes, such as e-mail and text message. Defining the role and purpose of the Slack team and delineating expectations for how the team will use Slack can help generate buy-in. Emphasizing that Slack can ultimately reduce the number of e-mails individuals receive may also encourage its use.

Variable buy-in among team members also represents a significant potential barrier to integrating Slack. Some will naturally feel intimidated by and

uncomfortable with Slack as a relatively novel platform. To successfully integrate Slack, all members of the team must be motivated to learn the platform and use it according to the expectations set forth. Providing onboarding to users and enhancing their comfort with the application through efficient, high-yield guidelines and direct peer teaching can address this barrier.

If buy-in and comfort with slack continues to remain variable across the team, team members may fail to check Slack regularly and may miss critical information. Sending selective supplemental e-mails to the group with time-sensitive or critical information may address this limitation, because most people tend to check e-mail daily.

Additionally, because Slack can reduce the threshold for communication and promote more informal and social interactions among team members, unprofessional behavior and miscommunication can occur. Setting ground rules and designating a moderator can help balance community building with professionalism.

If a large team uses Slack regularly, users may experience "notification overload" each time they receive messages. Team members can adjust notification settings according to their preferences to avoid this.

The free version of Slack may not meet the needs of a large team. Upgraded plans vary in price and offer enhanced features including unlimited message archive and apps, group calls with screen sharing, guest accounts and shared channels, unlimited workspaces, designated customer service teams, HIPAA-compliant message, and file collaboration. The additional cost of upgraded plans may limit use by teams without significant funding.

Table 4
Tools That Can be Utilized in Conjunction with Slack

Tool	Role	Examples
Video conferencing	Can facilitate synchronous, face-to-face discussions	Zoom Skype BlueJeans
Writing collaborative documents	Can facilitate real-time writing and brainstorming	GoogleDocs Microsoft 360 Suite Dropbox Paper
File storage	Can facilitate storage of manuscripts and relevant files	GoogleDrive Microsoft OneDrive Dropbox
Data entry	Can facilitate data entry and more complex surveys	GoogleForms GoogleSheets AirTable Jot Form Qualtrics
Scheduling	Can facilitate meeting scheduling and project planning	GoogleCalendar Outlook Calendar

Finally, Slack cannot achieve all of the tasks required of teams collaborating digitally. However, teams can utilize other available applications to fill this void (see Table 4 for details).

CONCLUSIONS

Digital collaboration afforded by Web 2.0 represents a powerful paradigm within which teams can manage competing responsibilities by faculty, collaborate across institution and geographic location, and reduce in-person meetings during public health crises such as COVID-19. Slack is a workplace communication tool and instant messaging platform that incorporates many of the benefits of more traditional platforms such as e-mail and text-message, but with several added features that enhance virtual teamwork. Within this framework, teams must anticipate and mitigate limitations to optimize use. Although Slack cannot achieve all tasks required of teams within one application, integrating other existing tools can address a broad spectrum of needs for virtual teams.

References

1. Gottlieb M, Fant A, King A, et al. One click away: digital mentorship in the modern era. Cureus 2017;9:e1838.
2. Rimmer A. Covid-19: medical conferences around the world are cancelled after US cases are linked to Massachusetts meeting. BMJ 2020;368:m1054.
3. Rose C, Mott S, Aa A, Lin M. Physically distant, educationally connected: interactive conferencing in the era of COVID-19. Med Educ 2020.
4. Johnson HA. Slack. J Med Libr Assoc 2018;106:148–51.
5. Armstrong MJ. Improving email strategies to target stress and productivity in clinical practice. Neurol Clin Pract 2017;7:512–7.
6. Wood KE, Krasowski MD. Academic e-mail overload and the burden of "Academic Spam". Acad Pathology 2020;7. https://doi.org/10.1177/2374289519898858
7. Paul IM, Levi BH. Metastasis of e-mail at an academic medical center. JAMA Pediatr 2014;168:290–1.
8. Clemons M, de Costa ES, Joy AA, et al. Predatory invitations from journals: more than just a nuisance? Oncologist 2017;22:236–40.
9. Chan T, Joshi N, Lin M, Mehta N. Using Google Hangouts on air for medical education: a disruptive way to leverage and facilitate remote communication and collaboration. J Grad Med Educ 2015;7:171–3.
10. Kwahk KY, Park DH. The effects of network sharing on knowledge-sharing activities and job performance in enterprise social media environments. Comput Hum Behav 2016;55:826–39.
11. About Us. Slack Technologies. 2020. Available at: https://slack.com/about. Accessed May 18, 2020.
12. About Our Company. Basecamp. 2020. Available at: https://basecamp.com/ab. Accessed May 18, 2020.
13. Welcome to Microsoft Teams. Microsoft. 2020. Available at: https://support.office.com/en-us/article/welcome-to-microsoft-teams-b98d533f-118e-4bae-bf44-3df2470c2b12. Accessed May 18, 2020.
14. Google Chat: A Messaging Platform Built for Teams. Google. 2020. Available at: https://gsuite.google.com/products/chat/. Accessed May 18, 2020.
15. Boyd DM, Ellison NB. Social network sites: definition, history, and scholarship. J Comput-Mediated Commun 2007;13:210–30.
16. Chan WS, Leung AY. Use of social network sites for communication among health professionals: systematic review. J Med Internet Res 2018;20:e117.
17. Vela K. Using Slack to communicate with medical students. J Med Libr Assoc 2018;106:504–7.
18. Hill J, LaFollette R, Grosso R, Axelson D, Hart K, McDonough E. Using Slack to facilitate virtual small groups for individualized interactive instruction. AEM Educ Train 2019;3:92–5.
19. Ross SM. Slack It to Me: complementing LMS with student-centric communications for the millennial/post-millennial student. J Mark Educ 2019;41:91–108.
20. Perkel JM. How scientists use Slack. Nature 2017;541:123–4.
21. Chung AS, Smart J, Zdradzinski M, et al. Educator toolkits on second victim syndrome, mindfulness and meditation, and positive psychology: the 2017 Resident Wellness Consensus Summit. West J Emerg Med 2018;19:327–31.
22. Gofine M, Clark S. Integration of Slack, a cloud-based team collaboration application, into research coordination. J Innov Health Inform 2017;24:936.
23. Slack Survey Results. Slack Technologies. 2016. Available at: https://a.slack-edge.com/7b00/img/survey/slack_survey_results.pdf. Accessed Mar 25, 2020.
24. Chan TM, Gottlieb M, Sherbino J, et al. The ALiEM Faculty Incubator: a novel online approach to faculty development in education scholarship. Acad Med 2018;93:1497–502.
25. Gisondi MA, Chou A, Joshi N, et al. Curriculum design and implementation of the emergency medicine chief resident incubator. Cureus 2018;10:e2223.
26. Paetow G, Zaver F, Gottlieb M, Chan TM, Lin M, Gisondi MA. Online mastermind groups: a non-hierarchical mentorship model for professional development. Cureus 2018;10:e3013.
27. Yarris LM, Chan TM, Gottlieb M, Juve AM. Finding your people in the digital age: virtual communities of practice to promote education scholarship. J Grad Med Educ 2019;11:1–5.

28. Messman AM, Malik A, Ehrman R. An asynchronous curriculum for teaching practical interpretation skills of clinical images to residents in emergency medicine. J Emerg Med 2020;58:299–304.

29. Lin M. ALiEM Connect: EM Residencies Unite in a Mega Virtual Conference. San Francisco: Academic Life in Emergency Medicine, 2020.

30. About ALiEMU. Academic Life in Emergency Medicine. 2016. Available at: https://www.aliemu.com/about/. Accessed May 18, 2020.

31. Ting DK, Thoma B, Luckett-Gatopoulos S, et al. CanadiEM: accessing a virtual community of practice to create a Canadian National Medical Education Institution. AEM Educ Train 2019;3:86–91.

32. Bauer TN, Erdogan B. Organizational socialization outcomes: now and into the future. In: Oxford Library of Psychology. The Oxford Handbook of Organizational Socialization. Oxford: Oxford University Press, 2012.

33. Ross WE, Huang KH, Jones GH. Executive onboarding: ensuring the success of the newly hired department chair. Acad Med 2014;89:728–33.

34. Kotter JP. Leading change: why transformation efforts fail. Harv Bus Rev 1995;59–67.

35. Bourhis A, Dubé L, Jacob R. The success of virtual communities of practice: the leadership factor. Electronic J Knowl Manag 2005;3:23–34.

36. Dimitri D, Gubert A, Miller AB, Thoma B, Chan T. A quantitative study on anonymity and professionalism within an online free open access medical education community. Cureus 2016;8:e788.

37. Thomas PA, Kern DE, Hughes MT, Chen BY. Curriculum Development For Medical Education: A Six-Step Approach. 3rd ed. Baltimore: Johns Hopkins University Press, 2016.

38. Gottlieb M, Wagner E, Wagner A, Chan T. Applying design thinking principles to curricular development in medical education. AEM Educ Train 2017;1:21–6.

39. DeCarlo M. Slack vs. Microsoft Teams: Team Collaboration and Communication Showdown. Fresh Meadows, NY: GetVOIP.com, 2019.

40. Gofine M, Clark S. Integration of Slack, a cloud-based team collaboration application, into research coordination: a research letter. J Innov Health Inform 2017; 24:252.

41. Gottlieb M, Landry A, Egan DJ, et al. Rethinking residency conferences in the era of COVID-19. AEM Educ Train 2020;4:313–7.

42. Frequently Asked Questions. Mission Critical Team Institute. 2018. Available at: https://missioncti.com/faqs/. Accessed May 18, 2020.

43. Case Studies. Arena Labs. 2018. Available at: https://arenalabs.global/casestudies/. Accessed May 18, 2020.