Training disrupted: Practical tips for supporting competency-based medical education during the COVID-19 pandemic

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PRACTICAL TIPS

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ABSTRACT

The COVID-19 pandemic has disrupted healthcare systems around the world, impacting how we deliver medical education. The normal day-to-day routines have been altered for a number of reasons, including changes to scheduled training rotations, physical distancing requirements, trainee redeployment, and heightened level of concern. Medical educators will likely need to adapt their programs to maximize learning, maintain effective care delivery, and ensure competent graduates. Along with a continued focus on learner/faculty wellness, medical educators will have to optimize existing training experiences, adapt those that are no longer viable, employ new technologies, and be flexible when assessing competencies. These practical tips offer guidance on how to adapt medical education programs within the constraints of the pandemic landscape, stressing the need for communication, innovation, collaboration, flexibility, and planning within the era of competency-based medical education.

Introduction

The COVID-19 global pandemic is challenging healthcare systems in unprecedented ways, affecting not only the delivery of care, but also our delivery of medical education. Across all countries and specialties – from Seattle to Singapore, and from Radiology to Rheumatology – medical education programs have been disrupted (Alvin et al. 2020; Kim et al. 2020; Koumpouras and Helfgott 2020; Liang et al. 2020).

Disruption in medical education can occur from time to time for a variety of reasons that are both internal and external to the system affected. Disruption is defined as a break or interruption in the normal course or continuation of some activity or process (Disruption 2020). The COVID-19 pandemic has had a major impact, such that our 'normal course' of education is not feasible, and yet our systems of medical education are largely still viable. Reflecting on prior pandemics, SARS caused a temporary disruption to residency education because of cancelled or abbreviated rotations, suspended learning activities, and resident redeployment to services considered more in need (Sherbino and Atzema 2004; Rambaldini et al. 2005). Recent literature suggests similar disruptions are occurring within the context of the COVID-19 pandemic. At this time, we hope that these disruptions will also be temporary; however, the duration of the impact remains uncertain. Residency programs around the globe are looking for ways to quickly adapt to missed or limited educational experiences and the constraints imposed by physical distancing measures (Alvin et al. 2020; Chick et al. 2020; Nassar et al. 2020; Potts 2020).

This pandemic comes at a time of curricular overhaul in medical education, with training programs globally shifting towards competency-based medical education (CBME) (Frank et al. 2017). These same programs are now struggling to cope with a disruption that has had substantial but variable effects across contexts. The range of impacts includes disrupted training experiences, trainee redeployment for safety or service demands, a myriad of barriers to usual academic programs and assessments, and a heightened level of anxiety that threatens trainee and faculty wellness. Medical educators need advice on how to effectively adapt programs to maximize learning, maintain effective care delivery, and ensure competent graduates. With all of this in mind, we present practical tips for supporting CBME during the initial disruption of a pandemic.

TIP #1 – Anticipate impact

It is important that we anticipate the range of impacts that a disruption of this magnitude will have on residency training. During SARS in 2004, ~60% of residents believed that SARS compromised their education due to cancelled educational activities or core rotations (Rambaldini et al. 2005). We must strive to maintain education integrity via training experiences and educational activities as much as possible and for as long as possible. There will be disruptions to training due to illness/quarantine, cancelled rotations, and redeployment, and some of these disruptions are more

predictable than others. It is crucial to be proactive and flexible. Another lesson learned from SARS is the need to communicate regularly with trainees to help alleviate their anxieties about upcoming and ongoing changes to their education (Rambaldini et al. 2005). As the COVID-19 situation continues to evolve, flexibility and clear communication are key.

TIP #2 – Keep learner and patient safety top of mind

Throughout this disrupted learning period, program leaders are asked to make numerous decisions that impact learner and patient safety. Although some institutional policies are mandating the suspension of clinical activities for medical students, (post)graduate trainees are often considered essential workers and, as such, share the collective duty to deliver patient care on the frontlines (Covid-19 2020; Moonen 2020). As educators, we need to carefully orient trainers to expectations in a frequently changing clinical learning environment to ensure the safety of both our trainees and patients. By working directly with trainees in the co-creation of these new expectations and procedures, we can ensure trainee-specific issues and impacts are top of mind. This approach will facilitate trainee engagement and uptake, providing trainees with a means for input and control in times of uncertainty. Lastly, a sustained focus on learner wellness during the pandemic, through regular communication, clinical debriefing, and enhanced social supports, will help promote safety for all learners, while also improving patient outcomes (Shanafelt et al. 2016; Collier 2017; Motluk 2018; West et al. 2018).

TIP #3 – Focus on wellness and monitor for trainee and educator burnout

The presence of burnout in practicing physicians and medical trainees is well documented in the literature and pre-exists the COVID-19 pandemic (CMA National Physician Health Survey 2018). There are many direct threats to wellness as this unpredictable, constantly evolving, disruptive environment leads to high levels of uncertainty, lack of control, and social and physical isolation, all of which can have negative psychological effects (Wu et al. 2020). As education leaders, we encourage you to go beyond usual routines of pre-COVID wellness practices and embrace a multi-modal approach to trainee and faculty health monitoring in the setting of physical and social distancing. Strategies to consider include system and program supports, including scheduling regular large-group virtual communication forums, using trainee–faculty systems for weekly check-ins (consider existing academic advisors) and faculty peer-support systems, and encouraging positive individual practices such as prioritizing family connection, healthy habits, and routines (rest, exercise, debriefing, unplugging, journaling and reflection, etc.). Further, familiarize yourself with additional resources and pathways to counselling and crisis services so that you can quickly navigate access for trainees and educators. Creating spaces to share personal vulnerability and threats to wellness for residents and faculty can reinforce the collective efforts to support each other in an unprecedented time of challenge (Brown 2012).

TIP #4 – Keep what you can: Maximize existing clinical teaching experiences

Addressing anticipated effects on your program can be overwhelming at a time when we are pulled in so many new directions. Often the best place to start is in itemizing the aspects of your program that are likely to continue providing safe and useful learning environments. There will be some existing clinical experiences that are preserved, less affected or even enhanced as a result of the pandemic disruptions. Some of these settings may need adjustments to adapt to pandemic-related changes, but they can still provide good learning opportunities. For example, while elective surgeries may have been cancelled, emergency outpatient clinics, such as fracture clinics, may continue. Rotations that were once too busy to allow for direct observation may have slowed enough to allow for this opportunity. Emergency medicine, inpatient internal medicine, and critical care rotations may have increased need for resident support, providing a place where learners may be welcomed if their planned rotations are no longer viable (Alvin et al. 2020; Sarpong et al. 2020; Wong et al. 2020). Some experiences may be continuing virtually, and with some guidance may be willing to incorporate learners (Koumpouras and Helfgott 2020; Schwartz et al. 2020). Virtual clinics offer a great opportunity for supervisors to 'listen in' on visits using telephone or video conferencing three-way calling features that allow for direct observation. Your program may offer optional quality improvement, research, ethics, or medical education blocks that have minimal clinical duties; these may offer opportunities for trainees who are self-isolating (Schwartz et al. 2020). Try your best to optimize existing training experiences wherever you can.

TIP #5 – Change what you have to: Innovate in the new environment

As a consequence of COVID-19, many specialties have seen a drastic decrease in the number of consultations in the emergency room, in-patient wards, and outpatient clinics, as well as a near-complete shutdown of elective surgery. In response, program directors have had to adjust training objectives for both on-service and off-service rotations so as to maximize the ability for trainees to acquire the necessary competencies. Accepting a work environment with much lower clinical volumes, you can adjust teaching and assessment to focus on many of the intrinsic CanMEDS roles such as the Collaborator, Communicator, Professionalism, and Leader (Frank et al. 2015). You can spend more time teaching and assessing trainees as they perform virtual patient assessments, participate in virtual teaching rounds, and engage in leadership activities like reorganizing call schedules due to quarantine measures. You may consider cancelling specific rotations in situations where no meaningful patient care experiences are expected (e.g. in services that provide elective surgery, such as hip and knee arthroplasty). Instead, you can develop a new clinical rotation (e.g. COVID-19 orthopedic

surgery) that has its own set of training objectives and assessments that are relevant for the available training circumstances.

TIP #6 – Adapt academic sessions to enhance learning and connections using novel technologies

COVID-19 presents a necessary moment for educators to critically examine and appropriately adapt the way we deliver academic sessions. Unlike the clinical learning environment, where there is the possibility of retaining the status quo in some areas, when thinking about virtual education we challenge you to 'redesign almost everything.' There must be more than an infinite loop of virtual lectures. You are not just transferring sessions to the digital space; you are re-thinking what is necessary and re-imagining what is possible. Just because your program has always done things a certain way (e.g. three-hour academic half day), does not mean that is the best model to achieve cognitive, social, and cultural learning objectives in the current reality.

Academic sessions of all types are the heart and soul of residency education. They are important rituals for the group (Bosk 1980; Purdy 2018). Without those touchstone events, in the era of physical distancing, building and maintaining that same rich sense of community poses a significant challenge, but it is not impossible. Small teams can perhaps work asynchronously through cases or topics throughout the week and in doing so foster regular, meaningful connection. Perhaps those teams can include attending physicians, other health professionals, or residents from various specialties, thereby strengthening relationships across traditional boundaries. Anything is possible. When dreaming big, look to successful models of virtual communities of practice for inspiration, such as Aliem, CanadiEM, and other Free Open Access Medical Education platforms (Roland et al. 2017; Chan et al. 2018; Ting et al. 2019). These groups leverage available communication technology to foster asynchronous connection and learning. They deliberately boost learners to the upper echelons of Bloom's taxonomy (Krathwohl and Anderson 2009) and the outcomes are amazing.

TIP #7 – Consider adaptive strategies for learning

The impact of COVID-19 on medical education has underscored the importance of identifying resources for remote learning and learning assessment. Explore existing e-learning resources sponsored by national and international societies. The Heart University, endorsed by the International Society for Adult Congenital Heart Disease, is a leading example of a modular system with classes, self-assessment tests, and learning analytics (Tretter et al. 2020). The program continues to collect and curate training modules and most recently has developed certification courses. Another example is the Collaborative Multi-Institutional Otolaryngology Residency Education Program sponsored by the University of Southern California. The program collaborates with educators from 42 training programs to provide daily lectures to more than 400 participants. This platform allows residents to listen to the lectures and, more importantly, participate in the discussions (Collaborative Multi-Institutional Otolaryngology Residency Education Program 2020). To further extend e-learning strategies, you should consider implementing or developing remote simulation learning using existing mobile technology and infrastructure. The Otolaryngology – Head & Neck Surgery training programs in Canada have piloted the OtoSim Mobile™, a device that attaches to a smart phone to simulate otoscopy. Not only does this provide a standardized curriculum for trainees nationally, it also collects performance analytics that can be shared with program directors to assess learners' competence.

TIP #8 – Recognize the increased need for coaching and individualized learning plans

In the face of this substantial disruption in the clinical and academic learning environments, trainees will undoubtedly require an increase in attention to individualized learning plans and longitudinal coaching. Already a focus of CBME programs (Van Melle et al. 2019), we suggest 'doubling down' on these program elements to counter strong disruptive forces. Engaging with coaches or academic advisors (Soleas et al. 2020) can help you program detect of impending or active problems in current learning environments or situations and then ameliorate the situation to find adaptations or solutions. The core features of a coaching relationship include a shared orientation towards growth and development, ongoing reflection, and an embrace of failure (or difficulty in our case) as a catalyst for learning (Watling and LaDonna 2019). Engaging with a coach or academic advisor (virtually or in person) to generate an effective individualized learning plan can help learners focus on pursuing key potential learning activities and acquiring necessary assessments rather than struggling with the difficulties (Rich et al. 2019). Depending on your resources and program size, this may mean more frequent meetings and regular check-ins with program directors, academic advisors, or other assigned coach/mentor figures to jointly ensure trainees are on the right track.

TIP #9 – Collaborate creatively to maximize efficiency for academic sessions

Recognize that you are not the only program director tasked with maintaining an academic program that will keep learners and faculty interested and engaged. Reach out to other program directors through your national society or accrediting organization and offer to share your learning resources for core teaching, Grand Rounds and Journal Club. The sharing of resources will both enrich the variety and quality of the academic sessions and foster collegiality. A regional teaching half-day has been successfully implemented for Otolaryngology – Head & Neck Surgery programs across three provinces in central Canada. This collaborative approach has eased the teaching burden placed upon faculty and has enabled them to dedicate more time to other professional commitments. Moreover, the higher rates of learner attendance will be interpreted as a greater appreciation of faculty efforts. It is particularly important to adopt virtual platforms that allow for recording and audience participation. Develop and regularly

update a master schedule of available teaching and distribute to all learners across programs. A master schedule is required to avoid repeating topics, stave off virtual meeting overload, and manage potential time zone issues.

TIP #10 – Keep on assessing

Assessing trainees during the COVID-19 pandemic can be challenging. Despite this, the tools that have historically been employed, such as multiple-choice exams, oral exams, simulation-based assessments, and workplace-based assessments (e.g. observations of professional activities and in-training assessments), can and should still be used to determine competence. However, you may need to adjust how and where they are used. On services where clinical volumes and risk are high, such as in critical care, you should give careful thought to the timing of assessments in light of safety and service requirements. Although observation and assessment can still be done from more than six feet away (or closer if the proper PPE is used), patient and healthcare team safety is paramount. As such, you might need to move certain assessments to environments that involve less risk, such as simulation. On services that have decreased clinical volumes, opportunities exist to provide more detailed feedback in the assessment process. Trainees on services that are less busy can focus their learning plans on acquiring the necessary intrinsic competencies (Sherbino et al. 2011). Trainees are likely to be working in a more team-based approach, and so you may need multi-source feedback and assessment if a singular faculty member is unable to provide a breadth of assessment (Harris et al. 2017).

TIP #11 – Accept flexibility in progression and certification decisions while ensuring demonstration of competence

Disruptions in training also have implications for the overall system of postgraduate medical education (PGME). PGME is designed with prescribed standards to ensure trainees are prepared for safe, independent practice in the next stage of their careers (Snell et al. 2017). Disruptions can impact this 'pipeline' of health professionals by interfering with required learning experiences, limiting exposure to key competencies, and decreasing the quantity and quality of teaching. In time of disruption, PGME institutions must employ flexibility and look for alternative evidence of achievement of competencies to progress learners.

In CBME systems, the primary focus is on progression towards achieving all prescribed competencies. From a system point of view, CBME implies a philosophy where there are many individual learner routes to competence. As such, committees and authorities that oversee programs and assessment of trainees need to apply holistic and developmental thinking, especially in times of disruption. Applied to competence committees in CBME, this means being less concerned about numbers of observations or assessments, and more with a holistic view of what evidence of competency achievement is available. For example, an Emergency Medicine trainee must acquire competencies around airway management, but the usual Anesthesiology rotation has been cancelled because operating theatres are closed during a disruption. The program director redeploys that trainee to an Emergency Room, which is still seeing patients requiring airway management. The program director supplements this experience with dedicated simulation center coaching. The Competence Committee signs off on the relevant assessments as evidence of achievement of the airway competencies. This is not the usual evidence, but it is defensible documentation of progression of competence.

In addition to reviewing alternate evidence of competence, committees should identify where there is missing evidence of competency achievement. Institutions should recognize the tension between the need for flexibility and the responsibility to maintain standards. The key is ensuring there is evidence of achievement of prescribed competencies for every learner, even if this evidence comes from activities outside the norm of the curriculum (Frank et al. 2010; Holmboe et al. 2010).

TIP#12 – Prepare for post-pandemic catch up

We anticipate that the disruption caused by COVID-19 will eventually lessen or end. It is important that we prepare for this post-pandemic period of education and clinical catch up with a plan to help and support residents in their quest to be competent and independent practitioners. This will be the time to refocus on medical education. During the pandemic disruption residents may have missed or had variable training experiences. You will need to survey the status of the program and complete a detailed review of each resident's progress in attaining competencies and training experiences. Together with your trainees and key stakeholders, you will likely need to revamp the schedule both broadly and to focus on individual trainee needs. Resident engagement/empowerment in this process will be key as priorities may have shifted during this time of disruption (Buttemer et al. 2020).

It is also important to anticipate the ongoing impact of COVID-19. There will be pressure to manage the immense backlog of clinical assessments and procedures caused by the pandemic. There may also be increasing pressure to limit resident involvement in procedures in the interest of efficiency. You will need to consider innovative ways to maintain resident training, while balancing clinical demands to ensure the acquisition of competencies. For example, you may use resident-specific learning goals to direct a resident's involvement in a procedure to a specific part of the task (Woelfel et al. 2020). Programs should also explore additional possible training sites (e.g. community) to avoid resident crowding and improve individual training experiences. Finally, you will need to ensure ongoing monitoring of catch up and of resident progress and well-being.

Conclusion

We recognize that these are difficult times. We hope that these tips will provide some direction for anticipating the initial stages of the disruption, managing key aspects of postgraduate programs during the pandemic, and preparing for post-pandemic catch up. Adjusting to the pandemic will require thoughtful planning, creativity, flexibility,

collaboration, and tolerance of uncertainty by all key stake-holders. We are all in this together.

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References

Alvin MD, George E, Deng F, Warhadpande S, Lee SI. 2020. The impact of covid-19 on radiology trainees. Radiology. DOI:10.1148/radiol.2020201222.

Bosk CL. 1980. Occupational rituals in patient management. N Engl J Med. 303(2):71–76.

Brown B. 2012. Daring greatly. New York: Penguin Random House.

Buttemer S, Hall J, Berger L, Weersink K, Dagnone JD. 2020. Ten ways to get a grip on resident co-production within medical education change. Can Med Educ J. 11(1):e124–e129.

Chan TM, Gottlieb M, Sherbino J, Cooney R, Boysen-Osborn M, Swaminathan A, Ankel F, Yarris LM. 2018. The aliem faculty incubator: a novel online approach to faculty development in education scholarship. Acad Med. 93(10):1497–1502.

Chick RC, Clifton GT, Peace KM, Propper BW, Hale DF, Alseidi AA, Vreeland TJ. 2020. Using technology to maintain the education of residents during the covid-19 pandemic. J Surg Educ. DOI:10.1016/j.jsurg.2020.03.018.

CMA National Physician Health Survey. 2018. [accessed 2020 Apr 28] https://www.cma.ca/sites/default/files/2018-11/nph-survey-e.pdf.

Collaborative Multi-Institutional Otolaryngology Residency Education Program. 2020. University of Southern California; [accessed 2020 Apr 28]. https://sites.usc.edu/ohnscovid/.

Collier R. 2017. Physician burnout a major concern. CMAJ. 189(39): E1236–E1237.

Covid-19. 2020. The Association of Faculties of Medicine of Canada; [accessed 2020 Apr 28]. https://afmc.ca/en/priorities/covid19.

Disruption. 2020. Merriam-Webster.com Dictionary; [accessed 2020 Apr 28]. https://www.merriam-webster.com/dictionary/disruption.

Frank JR, Snell LS, Cate OT, Holmboe ES, Carraccio C, Swing SR, Harris P, Glasgow NJ, Campbell C, Dath D, et al. 2010. Competency-based medical education: theory to practice. Med Teach. 32(8):638–645.

Frank JR, Snell L, Englander R, Holmboe ES, Collaborators I. 2017. Implementing competency-based medical education: moving forward. Med Teach. 39(6):568–573.

Frank JR, Snell LS, Sherbino J. 2015. Canmeds 2015 physician competency framework. Ottawa: Royal College of Physicians and Surgeons of Canada.

Harris P, Bhanji F, Topps M, Ross S, Lieberman S, Frank JR, Snell L, Sherbino J, Collaborators I. 2017. Evolving concepts of assessment in a competency-based world. Med Teach. 39(6):603–608.

Holmboe ES, Sherbino J, Long DM, Swing SR, Frank JR. 2010. The role of assessment in competency-based medical education. Med Teach. 32(8):676–682.

Kim CS, Lynch JB, Cohen S, Neme S, Staiger TO, Evans L, Pergam SA, Liu C, Bryson-Cahn C, Dellit TH. 2020. One academic health system's early (and ongoing) experience responding to covid-19: recommendations from the initial epicenter of the pandemic in the United States. Acad Med. DOI:10.1097/ACM.0000000000003410.

Koumpouras F, Helfgott S. 2020. Stand together and deliver: challenges and opportunities for rheumatology education during the covid19 pandemic. Arthritis Rheumatol. DOI:10.1002/art.41278.

Krathwohl DR, Anderson LW. 2009. A taxonomy for learning, teaching, and assessing: A revision of bloom's taxonomy of educational objectives. New York; San Francisco; London: Longman.

Liang ZC, Ooi SBS, Wang W. 2020. Pandemics and their impact on medical training: lessons from Singapore. Acad Med. DOI:10.1097/ACM.0000000000003441.

Moonen G. 2020. The priviledge of being a resident during covid-19. CMAJ Blogs. [accessed 2020 Apr 28]. https://cmajblogs.com/the-privilege-of-being-a-resident-during-covid-19/.

Motluk A. 2018. Do doctors experiencing burnout make more errors? CMAJ. 190(40):E1216–E1217.

Nassar AH, Zern NK, McIntyre LK, Lynge D, Smith CA, Petersen RP, Horvath KD, Wood DE. 2020. Emergency restructuring of a general surgery residency program during the coronavirus disease 2019 pandemic: the University of Washington experience. JAMA Surg. DOI:10.1001/jamasurg.2020.1219.

Potts JR. 3rd. 2020. Residency and fellowship program accreditation: effects of the novel coronavirus (covid-19) pandemic. J Am Coll Surg. DOI:10.1016/j.jamcollsurg.2020.03.026.

Purdy E. 2018. Amazing and awesome rounds. CanadiEM. [accessed 2020 Apr 28]. https://canadiem.org/amazing-awesome-rounds/.

Rambaldini G, Wilson K, Rath D, Lin Y, Gold WL, Kapral MK, Straus SE. 2005. The impact of severe acute respiratory syndrome on medical house staff: a qualitative study. J Gen Intern Med. 20(5):381–385.

Rich JV, Fostaty Young S, Donnelly C, Hall AK, Dagnone JD, Weersink K, Caudle J, Van Melle E, Klinger DA. 2019. Competency-based

education calls for programmatic assessment: but what does this look like in practice? J Eval Clin Pract. DOI:10.1111/jep.13328.

Roland D, Spurr J, Cabrera D. 2017. Preliminary evidence for the emergence of a health care online community of practice: using a netnographic framework for twitter hashtag analytics. J Med Internet Res. 19(7):e252.

Sarpong NO, Forrester LA, Levine WN. 2020. What's important: redeployment of the orthopaedic surgeon during the covid-19 pandemic: Perspectives from the trenches. J Bone Joint Surg Am. DOI:10.2106/JBJS.20.00574.

Schwartz AM, Wilson JM, Boden SD, Moore TJ, Bradbury TL, Fletcher ND. 2020. Managing resident workforce and education during the covid-19 pandemic. JBJS Open Access. 5(2):e0045.

Shanafelt TD, Mungo M, Schmitgen J, Storz KA, Reeves D, Hayes SN, Sloan JA, Swensen SJ, Buskirk SJ. 2016. Longitudinal study evaluating the association between physician burnout and changes in professional work effort. Mayo Clin Proc. 91(4):422–431.

Sherbino J, Atzema C. 2004. "SARS-Ed": severe acute respiratory syndrome and the impact on medical education. Ann Emerg Med. 44(3):229–231.

Sherbino J, Frank JR, Flynn L, Snell L. 2011. "Intrinsic roles" rather than "armour": renaming the "non-medical expert roles" of the CanMEDS framework to match their intent. Adv Health Sci Educ Theory Pract. 16(5):695–697.

Snell L, Frank J, Philak R, Sa J. 2017. Postgraduate medical education: a pipeline to competence. In: Dent J, Harden RM, Hunt D, editors. A practical guide for medical teachers. New York: Elsevier; p. 20–27.

Soleas E, Dagnone D, Stockley D, Garton K, van Wylick R. 2020. Developing academic advisors and competence committees members: a community approach to developing CBME faculty leaders. Can Med Educ J. 11(1):e46–e56.

Ting DK, Thoma B, Luckett-Gatopoulos S, Thomas A, Syed S, Bravo M, Zaver F, Purdy E, Kwok ESH, Chan TM. 2019. Canadiem: accessing a virtual community of practice to create a Canadian national medical education institution. AEM Educ Train. 3(1):86–91.

Tretter JT, Windram J, Faulkner T, Hudgens M, Sendzikaite S, Blom NA, Hanseus K, Loomba RS, McMahon CJ, Zheleva B, et al. 2020. Heart university: a new online educational forum in paediatric and adult congenital cardiac care. The future of virtual learning in a post-pandemic world? Cardiol Young. 30(4):560–567.

Van Melle E, Frank JR, Holmboe ES, Dagnone D, Stockley D, Sherbino J, International Competency-based Medical Education C. 2019. A core components framework for evaluating implementation of competency-based medical education programs. Acad Med. 94(7):1002–1009.

Watling CJ, LaDonna KA. 2019. Where philosophy meets culture: exploring how coaches conceptualise their roles. Med Educ. 53(5):467–476.

West CP, Dyrbye LN, Shanafelt TD. 2018. Physician burnout: contributors, consequences and solutions. J Intern Med. 283(6):516–529.

Woelfel I, Strosberg D, Smith B, Harzman A, Salani R, Cochran A, Chen X. 2020. The construction of case-specific resident learning goals. J Surg Educ. DOI:10.1016/j.jsurg.2020.02.021.

Wong CS, Tay WC, Hap XF, Chia FL. 2020. Love in the time of coronavirus: training and service during covid-19. Singapore Med J. DOI:10.11622/smedj.2020053.

Wu PE, Styra R, Gold WL. 2020. Mitigating the psychological effects of covid-19 on health care workers. CMAJ. 192(17):E459–E460.