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Impact of COVID-19 on endoscopy trainees: an international survey

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ABSTRACT

Background and Aims: Although COVID-19 has affected endoscopy services globally, the impact on trainees has not been evaluated. We aimed to assess the impact of COVID-19 on procedural volumes and on the emotional well-being of endoscopy trainees worldwide.

Methods: An international survey was disseminated over a 3-week period in April 2020. The primary outcome was the percentage reduction in monthly procedure volume before and during COVID-19. Secondary outcomes included potential variation of COVID-19 impact between different continents and rates and predictors of anxiety and burnout among trainees.

Results: Across 770 trainees from 63 countries, 93.8% reported a reduction in endoscopy case volume. The median percentage reduction in total procedures was 99% (IQR 85%-100%), which varied internationally (P<0.001) and was greatest for colonoscopy procedures. Restrictions in case volume and trainee activity were common barriers. A total of 71.9% were concerned that the COVID-19 pandemic could prolonged training. Anxiety was reported in 52.4% of respondents and burnout in 18.8%. Anxiety was independently associated with female gender (OR, 2.15; P<0.001), adequacy of PPE (OR, 1.75; P=0.005), lack of institutional support for emotional health (OR, 1.67; P=0.008) and concerns regarding prolongation of training (OR, 1.60; P=0.013). 68.9% indicated that existing national guidelines should be modified to support adequate endoscopy training during the pandemic.

Conclusion: The COVID-19 pandemic has led to restrictions in endoscopic volumes and endoscopy training, with high rates of anxiety and burnout among endoscopy trainees worldwide. Targeted measures by training programs to address these key issues are warranted to improve trainee well-being and support trainee education.

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has had a profound impact on the provision of GI endoscopy services worldwide, with the radical curtailment of elective procedures to restrict disease transmission.[1] Consequently, multiple gastroenterology and endoscopy societies have published rigorous recommendations on triaging endoscopy procedures, appropriate use of personal protective equipment (PPE) and postprocedure decontamination for GI endoscopy during the pandemic.[2–5] Surveys from Italy and North America have reported over 75% reductions in procedure numbers in many centers.[6,7] As institutions attempt to limit periendoscopic exposure to COVID-19 and conserve PPE, this will inevitably impact trainee engagement in hands-on endoscopy procedures.

The COVID-19 pandemic creates challenges for endoscopy trainees for several reasons. For trainees who are in direct contact with patients, providing clinical care during a pandemic can evoke fear and anxiety regarding personal safety and viral transmission.[8,9] Trainees also face social isolation due to restricted contact with their families and friends.[10] These concerns can be further exacerbated by inconsistency in scheduling, both due to trainees being quarantined and redeployment to other services.[11] Finally, trainees may be concerned about delays in competency acquisition and future job security.

Novice endoscopists must become proficient in a range of diagnostic and therapeutic modalities during a training period, often of finite duration. As it remains unclear when endoscopy units will fully resume regular activities, endoscopists-in-training may be concerned about attaining and maintaining competence in procedural skills. Additionally, trainee exposure to inpatient and ambulatory GI patients may be significantly reduced if institutions are limiting contact between consulting services and inpatients and cancelling non-essential office visits. Shortages of PPE could worsen these issues because trainees may be the first to be excluded when there is inadequate PPE.

Despite these issues, there are no published data on the impact of the COVID-19 on endoscopy training and trainee well-being. Therefore, in this international survey, we aimed to assess the impact of the COVID-19 pandemic on endoscopy trainees, including procedure

numbers, barriers to training, and the physical and emotional well-being of trainees. We also aimed to explore variation in this impact internationally.

METHODS

Survey Design

A 37-item survey (**Appendix 1**) was developed through consensus by an international group of representatives from 10 countries with expertise in endoscopy training and education. The survey was conducted using the SurveyMonkey platform (SVMK Inc, San Mateo, Calif, USA) and was structured into the following domains:

1) Demographics, including age, gender, country of training and specialization;
2) Monthly endoscopy volumes before and during COVID-19;
3) Training and availability of personal protective equipment (PPE);
4) Impact on physical, mental and emotional well-being.

The survey was reviewed and authorized for multicenter distribution by the ethics committee of the Institute for Clinical and Experimental Medicine, Thomayer Hospital, Prague, Czech Republic (Reference: 9170/7.4.202; G-20-16;8.4.2020), which waived the need for formal ethics application.

Outcomes

The primary outcome studied was the percentage reduction in the monthly volume of hands-on endoscopy procedures performed by trainees as a result of COVID-19. This was studied using 2 methods: (1) as a comparison over two 30-day periods before and during the COVID-19 pandemic, and (2) as a categorical variable according to trainee indication of an overall reduction in procedure volume. Endoscopy procedures studied comprised esophagogastroduodenoscopy (EGD), colonoscopy, EUS, ERCP, and upper gastrointestinal bleed hemostasis (included within the EGD numbers), for supervised, unsupervised and total numbers.

Secondary outcomes comprised:

1) Barriers to hands-on training and the impact on residual training opportunities;

2) Changes to institutional case volume

3) Trainee concerns regarding competency development and prolongation of training;

4) Anxiety, assessed using the Generalized Anxiety Disorder-7 (GAD-7) scale,[12] and rates of burnout, measured using the single item burnout scale.[13]

For each outcome, analyses were compared across continents to denote international variation in survey responses.

Survey Distribution

At the beginning of April 2020, the EndoTrain survey was distributed to trainees both directly and indirectly via program directors, trainee representatives, and to representatives within national and international societies (**Supplementary Table 1**). The survey was open for three weeks from April 11 to May 2, 2020.

Statistical Analysis

All continuous variables were subjected to normality assessment (Shapiro-Wilk) and presented as medians with interquartile ranges (IQRs) or means and standard error (SE) as appropriate. For each procedure, trainees who did not indicate any procedures in a given modality over the 2 comparison periods were excluded from analyses to identify active trainees for each procedure category. Pairwise comparisons of procedural numbers were performed at trainee-level between pre-COVID-19 and COVID-19 periods using Wilcoxon signed-rank tests. Nonparametric data across procedure types and continents were compared using Kruskal-Wallis, followed by Dunn's test for pairwise comparisons. Continuous variables were compared across continents using one-way analysis of variance (ANOVA). Categorical data were compared using the Pearson Chi-square test.

Binary logistic regression analysis was performed for univariable and multivariable analysis of factors associated with anxiety in endoscopy trainees. The GAD-7 outcomes were stratified into 2 groups by composite score: <5 and ≥5 (indicating at least mild anxiety). A forward stepwise approach to factor selection was used and outcomes presented as odds ratios (OR) and 95% confidence intervals (95% CI).

Statistical analyses were performed using SPSS v26 (Arkmont, NY, USA: IBM Corp) and Prism v8 (San Diego, Calif, USA: GraphPad Corp), with $P<0.05$ considered statistically significant.

RESULTS

Baseline Demographics

In total, 1199 respondents participated in the international training survey. After excluding incomplete responses (N=429, 35.8%), 770 trainees from 63 countries within six continents (**Supplementary Table 2 and Supplementary Fig. 1**) were included for analysis. Trainee characteristics and the differences across continents are presented in **Table 1**. The top 3 countries of respondents were the United States (N=169), United Kingdom (N=132), and Spain (N=82). The mean age of respondents was 32.6 (SE 0.2) with a male to female preponderance (56.9% versus 43.1%). Respondent specialties comprised adult gastroenterology (78.3%), pediatric gastroenterology (9.9%), surgery (7.7%), internal medicine (3.1%), and other (1.0%). The main focus of endoscopy training consisted of upper GI endoscopy (87.5%), lower GI endoscopy (83.1%), ERCP (20.4%), and EUS (13.0%).

Impact of COVID-19 on trainee procedural volumes

Overall, 770 trainees (93.8%) reported a reduction in their monthly endoscopy case volume attributable to COVID-19. By procedure type, the differences in estimated monthly volumes before and during COVID-19 are presented in **Figure 1**, with significant ($P<0.0001$) decrements over the two 30-day periods. Across all modalities (**Figure 2**), the median percentage reduction in procedural volume was 99% (IQR 85%-100%). This did not vary significantly by trainee specialty ($P=0.658$), or whether procedures were performed under supervision or independently ($P=0.614$), but varied by procedure type ($P<0.001$). On subgroup analysis,

percentage reductions were greater for colonoscopy (median 100%, IQR 88%-100%) compared with ERCP (median 100%, IQR 60%-100%; P=0.003) and upper gastrointestinal bleeding (UGIB) procedures (median 100%, IQR 50%-100%; P<0.001). This outcome also varied across continents (P<0.001), with significantly greater percentage reductions observed in Europe (median 100%, IQR 91%-100%) and North America (median 99%, IQR 88%-100%) compared to Asia (median 87%, IQR 75%-97%) and South America (median 91%, IQR 70%-100%).

Barriers to training

Of the 770 (93.8%) trainees who reported a reduction in endoscopy procedural volumes during the COVID-19 study period, the reasons cited included: changes to institutional policy to exclude trainees from procedures (79.9%); lack of cases (58.3%); shortage of available PPE (28.8%); redeployment to another clinical area (24.0%); and personal reasons (10.2%). Access to endoscopy training remained accessible on an ad hoc basis to 60.5% (N=466) of trainees, with rates varying internationally (**Table 2**). Of these, 36.1% (N=168) could perform endoscopy on patients at low risk or negative for COVID-19, and 7.9% (N=37) on unsupervised procedures only. 46.7% (N=359) reported access to ad hoc emergency cases and 15.4% (N=119) to intensive care unit (ICU) cases. Only 6.2% (N=29) reported no restrictions on their endoscopy privileges.

Reductions in institutional endoscopy case volume due to COVID-19 were reported by 98.2% of trainees, with 73.5% of trainees reporting a decrease of ≥50% and 3.6% reporting the cancellation of all endoscopy activity.

PPE

Regarding PPE, 73.7% (N=520) received training on the use of PPE for COVID-19 patients. 50.5% (N=356) received training specific to managing COVID-19 in their endoscopy unit. This was mainly delivered through face-to-face teaching (34.0%, N=121), virtual teaching (22.4%, N=80), or written communication (43.5%, N=155). The level of PPE used within the endoscopy

unit was felt to be adequate in 67.6% (N=476), but this varied internationally (P<0.001) (Table 2). 47.0% (N=331) believed that a lack of PPE was contributory to reductions in institutional endoscopy case volume. Endoscopy-specific practice guidelines on PPE use were available for 89.2% (628) of respondents. PPE policy within the endoscopy unit was predominantly directed by national guidelines (47.4%), individual unit/hospital policy (33.0%), or international guidelines (19.6%).

Physical and Mental Well-being

Concerns on training

Trainees were asked to rate their level of concern regarding the impact of COVID-19 on the outcome of their endoscopy training (**Table 3; Figure 4**). Concerns with competency development were raised by 90.1% (N=629) of trainees across continents (P=0.844). Concerns regarding the need to prolong specialty training to reach the required competency were raised by 71.9% (N=502) of respondents. This concern varied internationally (P<0.001), with the lowest proportion of concerned trainees in North America (49.5%). In total, 68.9% (N=472) of trainees believed that existing national/international guidelines should be modified to better support endoscopy training during the COVID-19 pandemic.

Physical health impact of COVID-19

Concerns of acquiring COVID-19 were expressed by 79.3% of trainees (**Figure 4**). In total, 23.9% (N=168) reported taking time off work for COVID-19 related reasons; 76.8% (N=129) took time off for themselves and the remaining 23.4% (N=39) for a household member. Of trainees affected, 14.7% (N=19) tested positive, 52.7% (N=68) negative, 30.2% (N=39) were not tested, and 2.3% (N=3) preferred not to answer.

Anxiety and Burnout

Anxiety and burnout were assessed in 695 trainees (**Table 3**). The following anxiety levels were reported according to GAD-7 criteria: no anxiety (47.6%, N=331), mild (33.2%, N=231), moderate (14.2%, N=99) and severe anxiety (7.8%, N=54). On multivariable analysis (**Table 4**), factors associated with anxiety in trainees included: female gender (OR, 2.15; P<0.001), adequacy of PPE (OR 1.75, P=0.005), concerns over prolongation of training (OR, 1.60; P=0.013) and lack of availability of institutional support for emotional health (OR, 1.67; P=0.008). Up to 18.8% of trainees met the criteria for burnout; burnout correlated positively with the severity of anxiety **(Supplementary Fig. 2)**. Institutional provision of emotional support strategies during the COVID-19 pandemic was available to 67.4% (N=467) of trainees.

DISCUSSION

To our knowledge, this is the first study to comprehensively evaluate the impact of COVID-19 on endoscopy trainees. Survey responses from 770 trainees across 63 countries indicate that COVID-19 has had a profound adverse effect on endoscopy volume worldwide, with reductions in training opportunities for the majority of trainees (93.8%), and a drastic median reduction in case volume of 99% (IQR, 85%-100%). This has raised concerns among trainees in regard to competency development (90%) and the potential need to prolong training to achieve endoscopic competence (72%). These concerns were among the cited factors leading to COVID-19 associated anxiety (52.4%) and burnout (18.8%) among trainees. These results highlight the urgent call to action for institutions, training programs, GI societies, and accreditation councils to address the 2 overarching issues identified: (1) reductions in endoscopic training opportunities and (2) the emotional welfare of trainees.

The emphasis on minimum endoscopy procedure numbers as a competence safeguard is ubiquitous across international training settings.[14] These serve to indicate readiness for certification, credentialing, and program completion. Although training in all procedures was disrupted by COVID-19, the decrement was most pronounced for colonoscopy and less so for emergency procedures (ERCP and GI bleeding). This is important as colonoscopy is regarded as a core endoscopic skill. Over 50% of trainees estimated a reduction in institutional endoscopy volumes of 75% or more, in line with international recommendations to curb

elective procedures. However, the exclusion of trainees was another major barrier, with PPE shortages and redeployment being contributory. The significant impact of COVID-19 has raised doubts among trainees over whether endoscopic competence in various procedures is realistically achievable within the duration of their training, with a substantial proportion expressing concerns that training will need to be prolonged. Addressing these issues could potentially have disruptive implications at many levels: restructuring of training curricula and schedules, redistribution of endoscopy cases between junior and senior trainees, delays in entering the workforce, financial strain and negative effects on trainees' mental well-being.

Indeed, relatively little has been published on the physical and mental well-being of endoscopy trainees, even before COVID-19. From our survey, COVID19 affected trainees beyond reductions in endoscopy training opportunities: 79.3% had concerns of acquiring COVID-19 and a significant proportion of trainees had to take time off work for COVID-19 related reasons. Inadequate PPE was raised as a concern by a third of respondents and was independently associated with increased anxiety. Overall, 52.4% of trainees met criteria for at least mild generalized anxiety, with 22.0% reaching a threshold score of ≥10, which has 89% sensitivity and 82% specificity for clinically significant anxiety.[12,15] Predictors of anxiety included female gender (consistent with population-based studies),[16] concerns regarding prolongation of training, inadequate PPE, and a lack of emotional and mental health support. Anxiety levels positively correlated with burnout which was identified in 18.8% of trainees. Burnout is a consequence of unmitigated chronic stress which requires urgent intervention as it can lead to emotional exhaustion, depersonalization, negativity and impaired professional performance,[17] including suboptimal medical care and medical error.[18,19] The association between the availability of emotional support and lower anxiety levels suggests that training programs should strongly consider implementing support strategies to proactively address anxiety and burnout in trainees and promote their well-being. Formalized interventions to improve trainee well-being, such as group stress management and resiliency training (SMART) may also play a positive role in improving job satisfaction and well-being.[16,21,22] There is additional need for attending gastroenterologists to proactively engage with trainees to discuss their learning gaps and career development and devise individualized curricula.

Internationally, there was significant heterogeneity in survey responses for both primary and secondary outcomes (**Tables 1-3**). These may be partially explained by locoregional differences in severity and the phase of the COVID-19 pandemic during the survey period. Nearly 50% of respondents were from the United States, United Kingdom, and Spain, which were in the acceleration to plateau phase in the 30 days leading up to the survey.[23] This is likely to account for the reductions in exposure to endoscopy training, institutional caseloads, uptake of PPE and time off work from COVID-19. It is possible that, as COVID-19 caseloads subside, training opportunities will slowly resume, although trainee exposure is still likely to be impacted due to prolonged turnaround times for decontamination and demand for PPE, in addition to the possibility of further disruptions during the "second wave." This may be due to global inequalities in healthcare, as evidenced by variations in availability of PPE, with adequate PPE reported by 79% of North American trainees, but only 31% of South American trainees. The structure of training programs is another relevant factor. Although concerns over competency development was consistent globally (P=0.84), concerns over prolongation of training varied (P<0.001). This may reflect differences in training systems and accreditation policies across countries.

Our study has several limitations. Surveys are vulnerable to bias and misinterpretation inherently. Data validation was performed by excluding respondents who provided incomplete responses of primary outcome data, did not indicate a training modality, and where endoscopy numbers performed each month in a given modality exceeded 100. It was also not possible to estimate the response rate as the survey was disseminated through multiple national and international societies and organizations. Not all countries and specialties were represented which might affect the generalizability of findings. Next, our data provide a snapshot of training in time and was not matched to regional differences in pandemic activity. Our completion rate was limited at 65%, with a further dropout rate of 11% for completing all survey questions. Contributory factors include the length of the survey, complexity of individual questions, and dissemination only in English, which may have affected comprehension. Additional data, such as unit-level information and lifetime procedure counts were not collected. Finally, baseline data for anxiety and burnout could not be retrospectively captured in a valid manner and therefore, the high rates of anxiety cannot be directly attributed to COVID-19 alone.

The effects of COVID-19 are projected to persist until at least 2022.[24] As such, an urgent review of endoscopy training is warranted to adapt accordingly and provide direction. In our survey, 68.9% of respondents indicated that guidelines should be modified to support training. Training programs should openly recognize that minimum procedural numbers may not be achievable in some countries and adopt mitigation strategies. First, emphasis should shift toward maximizing gains from evidence-based, hands-off training interventions. For beginners, simulation-based training can be used to develop technical skills,[25,26] nontechnical skills,[27] and accelerate time to achievement of competence.[28] Although simulation training requires performance feedback to be optimally effective,[29] self-assessment with benchmark videos and computerized feedback are viable alternatives.[30,31] For all trainees, cognitive competencies can be developed through distance education using educational resources, webinars, and open access social media education, such as structured conversations on Twitter.[32] All 3 major American GI societies have high-quality, expert-led, endoscopy training videos; notably the American Society for Gastrointestinal Endoscopy (ASGE) with its catalogue of education materials in GI Leap, its online learning platform.[32,33] Second, determination of competence should rely less on attaining minimum numbers and more on the use of objective and validated methods of competency assessment. This is best achieved through the use of objective performance tools with strong validity evidence, such as ACE (Assessment of Competency in Endoscopy),[34] DOPS (Direct Observation of Procedural Skills),[35–37] and GiECAT (Gastrointestinal Endoscopy Competency Assessment Tool),[38] which can allow trainers to target feedback provision in a formative manner, and to benchmark global competence for summative sign-off.[35] Despite these measures, it may be necessary for some trainees to extend their endoscopy training.[39] Additionally, it will be important for institutions and private practices to ensure that new faculty are closely mentored to promote continued skills development. With meaningful application of evidence-based training paradigms, the GI community can mitigate the ongoing impact of COVID-19 on trainees and ensure that they achieve the cognitive, technical, and integrative competencies needed for independent endoscopic practice.

The recent literature on the impact of COVID-19 on trainees stems from individual experiences and expert opinion.[10,33] Our trainee-centered survey has now quantified the impact of COVID-19 on procedural volumes and on the well-being of endoscopy trainees, and

shown how this varies internationally across different continents. As countries engage in collaborative endeavors to tackle the global impact of COVID-19, it is hoped that our findings will help to inform future strategies to mitigate the impact of the pandemic on endoscopy training.

CONCLUSION

Worldwide, the COVID-19 pandemic has led to drastic reductions in endoscopy volumes performed by trainees, which is causing concerns regarding competency development and possible prolongation of training. This has precipitated anxiety and burnout among trainees. Institutions, program directors and GI societies should provide clarity on curricular requirements and support the educational and emotional needs of trainees during this challenging time.

In this article, we aimed to assess the impact of COVID-19 on procedural volumes and the emotional well-being of endoscopy trainees worldwide. Our study showed that the COVID-19 pandemic has led to drastic reductions in endoscopic volumes and restrictions on endoscopy training, with detrimental effects on trainee well-being, including high rates of anxiety and burnout among trainees worldwide. Therefore, existing curricular requirements and delivery of endoscopy training should be urgently reviewed and adapted to support the educational and emotional needs of trainees during the COVID-19 pandemic.

REFERENCES

1. Repici A, Maselli R, Colombo M, et al. Coronavirus (COVID-19) outbreak: what the department of endoscopy should know. Gastrointest Endosc. Epub 2020 Mar 13. Available at: http://dx.doi.org/10.1016/j.gie.2020.03.019 [Accessed May 5, 2020].
2. Lui RN, Wong SH, Sánchez-Luna SA, et al. Overview of guidance for endoscopy during the coronavirus disease 2019 pandemic. J Gastroenterol Hepatol 2020. Available at: http://dx.doi.org/10.1111/jgh.15053 [Accessed May 3, 2020].
3. Chiu PWY, Ng SC, Inoue H, et al. Practice of endoscopy during COVID-19 pandemic: position statements of the Asian Pacific Society for Digestive Endoscopy (APSDE-COVID statements). Gut 2020. Available at: http://dx.doi.org/10.1136/gutjnl-2020-321185.
4. Sultan S, Lim JK, Altayar O, et al. AGA Institute Rapid Recommendations for Gastrointestinal Procedures During the COVID-19 Pandemic. Gastroenterology 2020. Available at: http://dx.doi.org/10.1053/j.gastro.2020.03.072 [Accessed May 3, 2020].

5. Gralnek IM, Hassan C, Beilenhoff U, et al. ESGE and ESGENA Position Statement on gastrointestinal endoscopy and the COVID-19 pandemic. Endoscopy 2020. Available at: http://dx.doi.org/10.1055/a-1155-6229 [Accessed May 3, 2020].

6. Repici A, Pace F, Gabbiadini R, et al. Endoscopy units and the COVID-19 Outbreak: A Multi-Center Experience from Italy. Gastroenterology 2020. Available at: http://dx.doi.org/10.1053/j.gastro.2020.04.003 [Accessed May 23, 2020].

7. Forbes N, Smith ZL, Spitzer RL, et al. Changes in Gastroenterology and Endoscopy Practices in Response to the COVID-19 Pandemic: Results from a North American Survey. Gastroenterology 2020. Available at: http://dx.doi.org/10.1053/j.gastro.2020.04.071 [Accessed May 23, 2020].

8. Rambaldini G, Wilson K, Rath D, et al. The impact of severe acute respiratory syndrome on medical house staff: a qualitative study. J Gen Intern Med 2005;20:381–385.

9. Wong SH, Lui RN, Sung JJ. Covid-19 and the digestive system. J Gastroenterol Hepatol 2020. Available at: http://dx.doi.org/10.1111/jgh.15047 [Accessed May 23, 2020].

10. Shah R, Satyavada S, Ismail M, et al. COVID-19 pandemic through the lens of a gastroenterology fellow: looking for the silver lining. Gastrointest Endosc 2020. Available at: http://dx.doi.org/10.1016/j.gie.2020.03.3852 [Accessed May 20, 2020].

11. Palchaudhuri S, Gabre J, Prenner S, et al. Adapting a GI Fellowship to a Pandemic: Novel Approaches to Accommodating a Novel Virus. Dig Dis Sci 2020;65:1562–1565.

12. Spitzer RL, Kroenke K, Williams JBW, et al. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med 2006;166:1092–1097.

13. Dolan ED, Mohr D, Lempa M, et al. Using a single item to measure burnout in primary care staff: a psychometric evaluation. J Gen Intern Med 2015;30:582–587.

14. Siau K, Hawkes ND, Dunckley P. Training in Endoscopy. Curr Treat Options Gastroenterol 2018;16:345–361.

15. Rutter LA, Brown TA. Psychometric Properties of the Generalized Anxiety Disorder Scale-7 (GAD-7) in Outpatients with Anxiety and Mood Disorders. J Psychopathol Behav Assess 2017;39:140–146.

16. Stein MB, Sareen J. CLINICAL PRACTICE. Generalized Anxiety Disorder. N Engl J Med 2015;373:2059–2068.

17. Rotenstein LS, Torre M, Ramos MA, et al. Prevalence of Burnout Among Physicians: A Systematic Review. JAMA 2018;320:1131–1150.

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

19. Amir M, Dahye K, Duane C, et al. Medical Student and Resident Burnout: A Review of Causes, Effects, and Prevention. J Fam Med Dis Prev 2018;4. Available at: http://dx.doi.org/10.23937/2469-5793/1510094 [Accessed June 7, 2020].

20. Adams JG, Walls RM. Supporting the Health Care Workforce During the COVID-19 Global Epidemic. JAMA 2020. Available at: http://dx.doi.org/10.1001/jama.2020.3972 [Accessed May 21, 2020].

21. Chaukos D, Chad-Friedman E, Mehta DH, et al. SMART-R: A Prospective Cohort Study of a Resilience Curriculum for Residents by Residents. Acad Psychiatry 2018;42:78–83.

22. West CP, Dyrbye LN, Rabatin JT, et al. Intervention to promote physician well-being, job satisfaction, and professionalism: a randomized clinical trial. JAMA Intern Med 2014;174:527–533.

23. Johns Hopkins University. COVID-19 Map. Johns Hopkins Coronavirus Resource Center. Available at: https://coronavirus.jhu.edu/map.html [Accessed May 3, 2020].

24. Kissler SM, Tedijanto C, Goldstein E, et al. Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period. Science 2020. Available at: http://dx.doi.org/10.1126/science.abb5793 [Accessed May 19, 2020].

25. Grover SC, Garg A, Scaffidi MA, et al. Impact of a simulation training curriculum on technical and nontechnical skills in colonoscopy: a randomized trial. Gastrointest Endosc 2015;82:1072–1079.

26. Grover SC, Scaffidi MA, Khan R, et al. Progressive learning in endoscopy simulation training improves clinical performance: a blinded randomized trial. Gastrointest Endosc 2017;86:881–889.

27. Walsh CM, Scaffidi MA, Khan R, et al. A non-technical skills curriculum incorporating simulation-based training improves performance in colonoscopy among novice endoscopists: A randomized controlled trial. Dig Endosc 2020. Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/den.13623 [Accessed May 21, 2020].

28. Siau K, Hodson J, Neville P, et al. Impact of a simulation-based induction programme in gastroscopy on trainee outcomes and learning curves. World J Gastrointest Endosc 2020;12:98–110.

29. Kruglikova I, Grantcharov TP, Drewes AM, et al. The impact of constructive feedback on training in gastrointestinal endoscopy using high-fidelity Virtual-Reality simulation: a randomised controlled trial. Gut 2010;59:181–185.

30. Scaffidi MA, Walsh CM, Khan R, et al. Influence of video-based feedback on self-assessment accuracy of endoscopic skills: a randomized controlled trial. Endosc Int Open 2019;7:E678–E684.

31. Vilmann AS, Norsk D, Svendsen MBS, et al. Computerized feedback during colonoscopy training leads to improved performance: a randomized trial. Gastrointest Endosc 2018;88:869–876.

32. ASGE. American Society for Gastrointestinal Endoscopy: guidance for trainees during the COVID-19 pandemic. Gastrointest Endosc. Epub 2020. Available at: http://dx.doi.org/10.1016/j.gie.2020.05.032.

33. Keswani RN, Sethi A, Repici A, et al. How To Maximize Trainee Education During the COVID-19 Pandemic: Perspectives from Around the World. Gastroenterology 2020. Available at: http://dx.doi.org/10.1053/j.gastro.2020.05.012 [Accessed May 20, 2020].

34. ASGE Training Committee, Sedlack RE, Coyle WJ, et al. ASGE's assessment of competency in endoscopy evaluation tools for colonoscopy and EGD. Gastrointest Endosc 2014;79:1–7.

35. Siau K, Crossley J, Dunckley P, et al. Colonoscopy Direct Observation of Procedural Skills

Assessment Tool for Evaluating Competency Development During Training. Am J Gastroenterol 2020;115:234–243.

36. Siau K, Dunckley P, Feeney M, et al. ERCP assessment tool: evidence of validity and competency development during training. Endoscopy 2019;51:1017–1026.

37. Siau K, Crossley J, Dunckley P, et al. Direct observation of procedural skills (DOPS) assessment in diagnostic gastroscopy: nationwide evidence of validity and competency development during training. Surg Endosc 2020;34:105–114.

38. Walsh CM. In-training gastrointestinal endoscopy competency assessment tools: Types of tools, validation and impact. Best Pract Res Clin Gastroenterol 2016;30:357–374.

39. Siau K, John Morris A, Murugananthan A, et al. Variation in exposure to endoscopic haemostasis for acute upper gastrointestinal bleeding during UK gastroenterology training. Frontline Gastroenterol 2019. Available at: http://dx.doi.org/10.1136/flgastro-2019-101351 [Accessed June 7, 2020].

REFERENCES

FIGURE CAPTIONS

Figure 1: Comparison of trainee-reported number of supervised procedures (**A**), independent procedures (**B**), and total procedures (**C**) in the 30-day period pre (PRE) and during COVID-19 (COVID). Symbols and error bars represent the median and interquartile ranges. *0.0001<P<0.05, **P<0.0001; EGD: esophagogastroduodenoscopy, Colon: colonoscopy, ERCP: endoscopic retrograde cholangiopancreatography, EUS: endoscopic ultrasound, UGIB: upper gastrointestinal bleeding hemostasis.

Figure 2: Box-and-whisker plots illustrating the percentage reduction in total (supervised and independent) procedures performed by trainees during the COVID-19 pandemic. Boxes cover medians and lower interquartile range whereas the whiskers represent the lower 90th percentile. The mean percentage reduction is indicated with the (+) symbol. *0.0001<P<0.05, **P<0.0001; EGD: esophagogastroduodenoscopy, Colon: colonoscopy, ERCP: endoscopic retrograde cholangiopancreatography, EUS: endoscopic ultrasound, UGIB: upper gastrointestinal bleeding haemostasis.

Figure 3: Concerns raised by endoscopy trainees attributable to the COVID-19 pandemic.

TABLES

Table 1: Baseline characteristics of trainees stratified by continent. All percentages are based on the number of respondents per question.

	Total (N=770)	North America (N=205)	Europe (N=323)	Australia/New Zealand (N=40)	Asia (N=90)	South America (N=99)	Africa (N=13)	*P* value
Mean age (SE)	32.6 (0.2)	32.4 (0.2)	32.4 (0.3)	33.0 (0.7)	33.4 (0.8)	32.3 (0.5)	36.6 (1.5)	0.11
Male (%)	417 (56.9)	115 (59.9)	157 (50.5)	26 (66.7)	67 (80.7)	45 (46.4)	7 (63.6)	<0.001
Specialty (%) Adult GI Internal Medicine Pediatric GI Surgery Other	 603 (78.3) 24 (3.1) 76 (9.9) 59 (7.7) 8 (1.0)	 152 (74.2) 1 (0.5) 52 (25.4) 0 (0.0) 0 (0.0)	 274 (84.8) 15 (4.6) 6 (1.9) 27 (8.4) 1 (0.3)	 32 (80.0) 1 (2.5) 0 (0.0) 7 (17.5) 0 (0.0)	 81(90.0) 2 (2.2) 6 (6.7) 1 (1.1) 0 (0.0)	 55 (55.6) 3 (2.0) 12 (12.1) 22 (22.2) 7 (7.1)	 9 (69.2) 2 (15.4) 0 (0.0) 2 (15.4) 0 (0.0)	<0.001
Mean years of training (SE)	2.7 (0.1)	2.0 (0.1)	3.2 (0.1)	1.9 (0.2)	2.5 (0.3)	2.6 (0.3)	4.8 (1.5)	<0.001
Advanced endoscopy focused training (%) (vs general GI)	135 (17.5)	9 (4.9)	57 (17.7)	7 (17.5)	22 (24.4)	35 (35.4)	5 (38.5)	<0.001

Table 2: Impact of COVID-19 on endoscopy training stratified by continent. All percentages are based on the number of respondents per question.

	Total (N=770)	North America (N=205)	Europe (N=323)	Australia/ New Zealand (N=40)	Asia (N=90)	South America (N=99)	Africa (N=13)	*P* value
Reduced endoscopy exposure (%)	722 (93.8)	201 (98.1)	302 (93.5)	38 (95.0)	86 (95.6)	82 (82.8)	13 (100.0)	<0.001
Endoscopy opportunities available								
None (no endoscopy)	304 (39.5)	80 (39.0)	166 (51.4)	20 (50.0)	17 (18.9)	18 (18.2)	3 (23.0)	<0.001
No restrictions	29 (3.8)	4 (2.0)	14 (4.3)	5 (12.5)	4 (4.4)	1 (1.0)	1 (7.7)	0.02
Unsupervised cases	40 (5.2)	3 (1.5)	19 (5.9)	3 (7.5)	9 (10.0)	4 (4.0)	2 (15.3)	0.02
Only low-risk/negative COVID patients	174 (22.6)	66 (32.2)	34 (10.5)	10 (25.0)	28 (31.1)	32 (32.3)	4 (30.8)	<0.001
Change in institutional endoscopy volume								<0.001
Decreased 1-24%	13 (1.7)	1 (0.5)	3 (1.0)	1 (2.5)	3 (3.4)	5 (5.2)	0 (0.0)	
Decreased 25-49%	61 (8.1)	10 (4.9)	23 (7.3)	8 (20.0)	13 (14.8)	6 (6.2)	1 (8.3)	
Decreased 50-74%	211 (28.0)	37 (18.2)	94 (29.8)	19 (47.5)	31 (35.2)	26 (26.8)	4 (33.3)	
Decreased 75-99%	327 (43.3)	114 (56.2)	130 (41.3)	7 (17.5)	35 (39.8)	36 (37.1)	5 (41.7)	
Decreased 100%	28 (3.7)	3 (1.5)	15 (4.8)	0 (0.0)	1 (1.1)	8 (8.3)	1 (8.3)	
Not affected	14 (1.9)	3 (1.5)	5 (1.6)	0 (0.0)	1 (1.1)	5 (5.2)	0 (0.0)	
Decreased (unknown%)	101 (13.4)	35 (17.2)	45 (14.3)	5 (12.5)	4 (4.6)	11 (11.3)	1 (8.3)	
Mean % reduction in procedures per month during COVID-19 (SE)								
EGD	85.3 (1.3)	90.4 (1.1)	89.6 (1.2)	78.2 (5.3)	81.9 (2.5)	65.1 (9.4)	78.6 (5.9)	<0.001
Colonoscopy	85.8 (2.6)	92.1 (1.1)	90.1 (1.4)	76.7 (5.9)	79.2 (2.8)	59.8 (2.4)	83.7 (6.2)	<0.001
ERCP	70.5 (4.2)	70.0 (9.5)	72.4 (6.9)	63.3 (1.7)	65.1 (9.6)	71.8 (8.3)	88.9 (0.1)	0.99
EUS	78.2 (7.7)	56.3 (2.6)	82.6 (4.4)	85.0 (7.2)	94.3 (3.1)	94.4 (3.9)	100.0 (0.0)	0.60
All	86.2 (1.2)	90.1 (1.1)	90.0 (1.2)	78.7 (5.2)	81.4 (2.4)	69.4 (8.5)	80.9 (5.6)	<0.001
PPE adequate in endoscopy unit (%)	476 (67.6)	154 (79.4)	218 (73.9)	27 (69.2)	47 (61.0)	27 (31.0)	3 (25.0)	<0.001
Taken off work for COVID-19 related reasons	168 (23.9)	24 (12.4)	91 (30.9)	4 (10.3)	18 (23.7)	24 (27.6)	7 (58.3)	<0.001

Table 3: Impact of COVID-19 on trainee well-being and on the use of alternate endoscopy education resources, stratified by continent. All percentages are based on the number of respondents per question.

	Total (N=770)	**North America (N=205)**	**Europe (N=323)**	**Australia/ New Zealand (N=40)**	**Asia (N=90)**	**South America (N=99)**	**Africa (N=13)**	***P* value**
Concerns (%)								
Acquiring COVID-19	618 (88.3)	187 (96.4)	228 (78.1)	36 (92.3)	75 (98.7)	82 (94.3)	10 (83.3%)	<0.001
Competency Development	629 (90.1)	176 (89.3)	260 (89.3)	34 (87.2)	68 (90.7)	79 (90.8)	12 (100)	0.844
Prolonging training	502 (71.9)	96 (49.5)	230 (79)	33 (84.6)	55 (73.3)	78 (89.7)	10 (83.3)	<0.001
Calls for changes to guidelines to support training (%)	472 (68.9)	133 (69.3)	175 (61.4)	29 (74.4)	56 (75.7)	68 (81.0)	11 (100)	0.001
Anxiety (%)								0.164
None	311 (44.7)	86 (44.3)	127 (44.1)	22 (56.4)	39 (52.0)	32 (36.8)	5 (41.7)	
Mild	231 (33.2)	61 (31.4)	104 (36.1)	14 (35.9)	21 (28.0)	30 (34.5)	1 (8.3)	
Moderate	99 (14.2)	29 (14.9)	39 (13.5)	2 (5.1)	11 (14.7)	14 (16.1)	4 (33.3)	
Severe	54 (7.8)	18 (9.3)	18 (6.3)	1 (2.6)	5 (5.3)	11 (12.6)	2 (16.7)	
Burnout (%)	130 (18.8)	42 (21.8)	53 (18.4)	1 (2.6)	12 (16.0)	18 (20.7)	4 (36.4)	0.058
Institutional support (%)	467 (67.4)	175 (90.7)	195 (67.7)	27 (69.2)	41 (54.7)	25 (28.7)	4 (36.4)	<0.001

Table 4: Multivariable analysis of factors associated with anxiety in endoscopy trainees.

Factor	N	Anxiety (%)	Univariable Analysis		Multivariable Analysis	
			OR (95%CI)	*P* value	OR (95%CI)	*P* value
Trainee Age						
Per year	N/A		1.01 (0.98 – 1.05)	0.577		
Sex						
Male	288	46.8%	*REF*			
Female	380	66.0%	2.20 (1.64 – 3.02)	**<0.001***	2.15 (1.52 – 3.05)	**<0.001***
Region						
North America	194	*55.7%*	*REF*			
Europe	288	55.9%	1.01 (0.70 – 1.46)	0.960		
South America	87	63.2%	1.37 (0.81 – 2.30)	0.237		
Australia	39	43.6%	0.62 (0.31 – 1.23)	0.170		
Asia	75	48.0%	0.74 (0.43 – 1.25)	0.259		
Africa	12	58.3%	1.12 (0.34 – 3.64)	0.857		
Years in Training						
Per year	N/A		0.96 (0.89 – 1.02)	0.170		
Specialty						
Surgery	50	56.0%	*REF*			
Adult GI	546	54.0%	0.92 (0.52 – 1.66)	0.789		
Internal medicine	20	70.0%	1.83 (0.60 – 5.55)	0.283		
Paediatric GI	73	57.5%	1.07 (0.52 – 2.20)	0.866		
Other	6	83.3%	3.93 (0.43 – 36.12)	0.227		
Reduced Endoscopy Exposure						
Yes	654	55.8%	*REF*			
No	41	46.3%	0.68 (0.36 – 1.29)	0.239		
Redeployment						
No	536	58.5%	*REF*			
Yes	159	54.3%	1.19 (0.83 – 1.70)	0.350		
Perceived Adequacy of PPE						
Yes	471	50.3%	*REF*			
No	224	65.6%	1.89 (1.36 – 2.62)	**<0.001**	1.75 (1.18 – 2.57)	**0.005***
Training on PPE						
Yes	513	54.0%	*REF*			
No	182	58.8%	1.22 (0.86 – 1.71)	0.264		
Time off work due to COVID-19						
No	528	54.5%	*REF*			
Yes	167	57.5%	0.89 (0.63 – 1.26)	0.506		
Concerns with developing COVID-19						
No	81	51.9%				
Yes	614	55.7%	1.17 (0.73 – 1.86)	0.513		
Concerns with competency acquisition						
No	69	43.5%				
Yes	626	56.5%	1.69 (1.03 – 2.79)	**0.040***		
Concerns with prolongation of training						
No	82	42.1%	*REF*			
Yes	302	60.4%	2.10 (1.50 – 2.94)	**<0.001***	1.60 (1.10 – 2.32)	**0.013***
Availability of institutional support for emotional / mental health						
Yes	467	50.7%	*REF*			
No	226	64.2%	1.74 (1.25 – 2.41)	**0.001***	1.67 (1.14 – 2.45)	**0.008***

Acronyms and abbreviations (list all that are used in paper with their spell-outs)

ABBREVIATIONS

ACE: Assessment of Competency in Endoscopy

ANOVA: analysis of variance

ASGE: American Society for Gastrointestinal Endoscopy

COVID-19: coronavirus disease 2019

DOPS: Direct Observation of Procedural Skills

GiECAT: Gastrointestinal Endoscopy Competency Assessment Tool

EGD: esophagogastroduodenoscopy

ERCP: endoscopic retrograde cholangiopancreatography

EUS: endoscopic ultrasound

GAD-7: Generalized Anxiety Disorder-7

GI: gastrointestinal

ICU: intensive care unit

IQR: interquartile range

OR: odds ratio

PPE: personal protective equipment

SE: standard error

SMART: stress management and resiliency training

UGIB: upper gastrointestinal bleeding

Completed IRB Checklist (from Notes above)

ETICKÁ KOMISE

PŘI INSTITUTU KLINICKÉ A EXPERIMENTÁLNÍ MEDICÍNY A THOMAYEROVĚ NEMOCNICI
S MULTICENTRICKOU PŮSOBNOSTÍ
Ethics Committee of the Institute for Clinical and Experimental Medicine and Thomayer Hospital
***with** Multi-center Competence*

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IKEM

Vážený pan
MUDr. Jan Král
IKEM

Č.j./ *Docket No.:* 9170/7.4.2020 (G-20-16) Praha/ *Prague*, 8.4.2020

Stanovisko etické komise k výzkumnému projektu pod názvem: **Dopad probíhající pandemie COVID-19 na výuku endoskopických metod (Impact of COVID-19 on Endoscopic Training)**

Etická komise IKEM + TN dne 8.4.2020 posoudila předložený výzkumný projekt a shledala, že

NEPODLÉHÁ SCHVÁLENÍ EK

Etická komise - 3 - IKEM + TN Vídeňská 800 140 59 Praha 4 Krč

Prof. MUDr. Vladimír Staněk, CSc.
předseda komise

Seznam členů etické komise/ *List of the Ethics Committee Members:*

Jméno a příjmení *First name and surname*	Muž/ Žena *Male/ Female*	Odbornost *Specialism*	Zaměstnanec/ *Employee of:* IKEM	TN	Funkce v EK *Role in EC*	Přítomen *Attendance* Ano *Yes*	Ne *No*	Hlasoval *Voted* Ano *Yes*	Ne *No*
Prof. MUDr. Vladimír Staněk, CSc.	M/M	kardiolog/ *cardiologist*	☒	☐	předseda/ *president*	☒	☐	☒	☐
Mgr. Petr Baum	M/M	právník *lawyer*	☐	☒	tajemník/ *secretary*	☒	☐	☒	☐
MUDr. Regina Amortová	Ž/F	internistka/ *internist*	☐	☐	člen/ *member*	☐	☒	☐	☒
MUDr. Maria Balcarová	Ž/F	Psychiatr/ *psychiatrist*	☐	☒	člen/ *member*	☒	☐	☒	☐
Doc. MUDr. Tomáš Büchler, Ph.D.	M/M	doktor/ *doctor*	☐	☒	člen/ *member*	☒	☐	☒	☐
Doc. MUDr. Pavel Drastich, PhD.	M/M	hepatogastroenterolog/ *hepatogastroenterologist*	☒	☐	člen/ *member*	☒	☐	☐	☒
MUDr. Marie Gebauerová	Ž/F	kardiolog/ *cardiologist*	☒	☐	člen/ *member*	☒	☐	☒	☐
Ing. Antonín Grošpic, CSc	M/M	inženýr/ *engineer*	☐	☐	člen/ *member*	☒	☐	☒	☐
MUDr. Radomíra Kožnarová, CSc	Ž/F	diabetolog/ *diabetologist*	☒	☐	člen/ *member*	☐	☒	☐	☒
MUDr. Pavel Kabíček, CSc.	M/M	pediatr/ *pediatrician*	☐	☒	člen/ *member*	☐	☒	☐	☒
MUDr. Tom Philipp, PhD., MBA	M/M	revmatolog/ *rheumatologist*	☐	☒	člen/ *member*	☒	☐	☒	☐
MUDr. Josef Šedivý, CSc.	M/M	klinický farmakolog/ *clin. pharmacologist*	☐	☐	člen/ *member*	☐	☒	☐	☒

Etická komise prohlašuje, že byla ustavena a pracuje podle jednacího řádu v souladu se správnou klinickou praxí (GCP) a platnými právními předpisy/*The Ethics Committee hereby declares that it was established and operates in accordance with its Rules of Procedure in compliance with Good Clinical Practice and valid legal regulations:*

☒Ano/*Yes* ☐Ne/*No* Komentář/*Comments:* -

Etická komise - 3 - IKEM + TN Vídeňská 800 140 59 Praha 4 Krč

DATUM/*DATE:* **8.4.2020**

PODPIS/*SIGNATURE:*

Prof. MUDr. Vladimír Staněk, CSc.
předseda etické komise/
Chairman of the Ethics Committee

ETICKÁ KOMISE
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IKEM

PROHLÁŠENÍ ETICKÉ KOMISE

8.4.2020

Etická komise při Institutu klinické a experimentální medicíny a Thomayerově nemocnici v Praze posuzuje projekty biomedicínského výzkumu zahrnujícího lidské účastníky včetně projektů klinických studií jak z hlediska etického, tak medicínského.
Etická komise při IKEM a TN pracuje podle Statutu a při posuzování všech projektů se obecně řídí Helsinskou deklarací Světové lékařské asociace (**WMA**), mezinárodními etickými směrnicemi pro biomedicínský výzkum zahrnující lidské účastníky (připravené Radou pro mezinárodní organizace lékařských věd – **CIOMS**, ve spolupráci se Světovou zdravotnickou organizací – **WHO**, vydané v Ženevě 1993).
Při posuzování klinických studií se etická komise řídí zákonem **č. 378/2007 Sb.** o léčivech a o změnách a doplnění některých souvisejících zákonů v platném znění, vyhláškou **č. 226/2008 Sb.**, kterou se stanovuje správná klinická praxe a bližší podmínky klinického hodnocení léčiv, dále zákonem **č. 268/2014 Sb.** o zdravotnických prostředcích a o změně některých souvisejících zákonů v platném znění a zákonem **č. 110/2019 Sb.**, o zpracování osobních údajů a o změně některých zákonů v platném znění, včetně Obecného nařízení o ochraně osobních údajů (GDPR).

Statement of the Ethics Committee

The Ethics Committee of the Institute for Clinical and Experimental Medicine (IKEM) and Thomayer Hospital (TN) in Prague reviews biomedical research projects involving human subjects, including clinical study projects, from both ethical and medical aspects.
The Ethics Committee of IKEM and TN works according to the Statute, and when reviewing all projects, it generally follows the Declaration of Helsinki of the World Medical Association **(WMA)**, international ethical guidelines for biomedical research involving human subjects (written by the Council for International Organizations of Medical Sciences – **CIOMS**, in cooperation with the World Health Organization – **WHO**, published in Geneva in 1993).
When reviewing the clinical studies, the Ethics Committee follows **Act No. 378/2007 Coll.** on pharmaceuticals and on the changes and amendments to some related acts, as amended, **Decree No. 226/2008 Coll.** which regulates Good Clinical Practice and detailed conditions of clinical trials of pharmaceutical products, also **Act No. 268/2014 Coll.** on medical devices and on the change to some related acts, as amended, and **Act No. 110/2019 Coll.** on personal data protection and on the change to some acts, as amended including the General Data Protection Regulation (GDPR).

Prof. V. Staněk, MD, PhD
Předseda komise/ *Chairman of the Committee*

Etická komise - 3 - IKEM + TN Vídeňská 800 140 59 Praha 4 Krč

[stamp:]
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Fig 1

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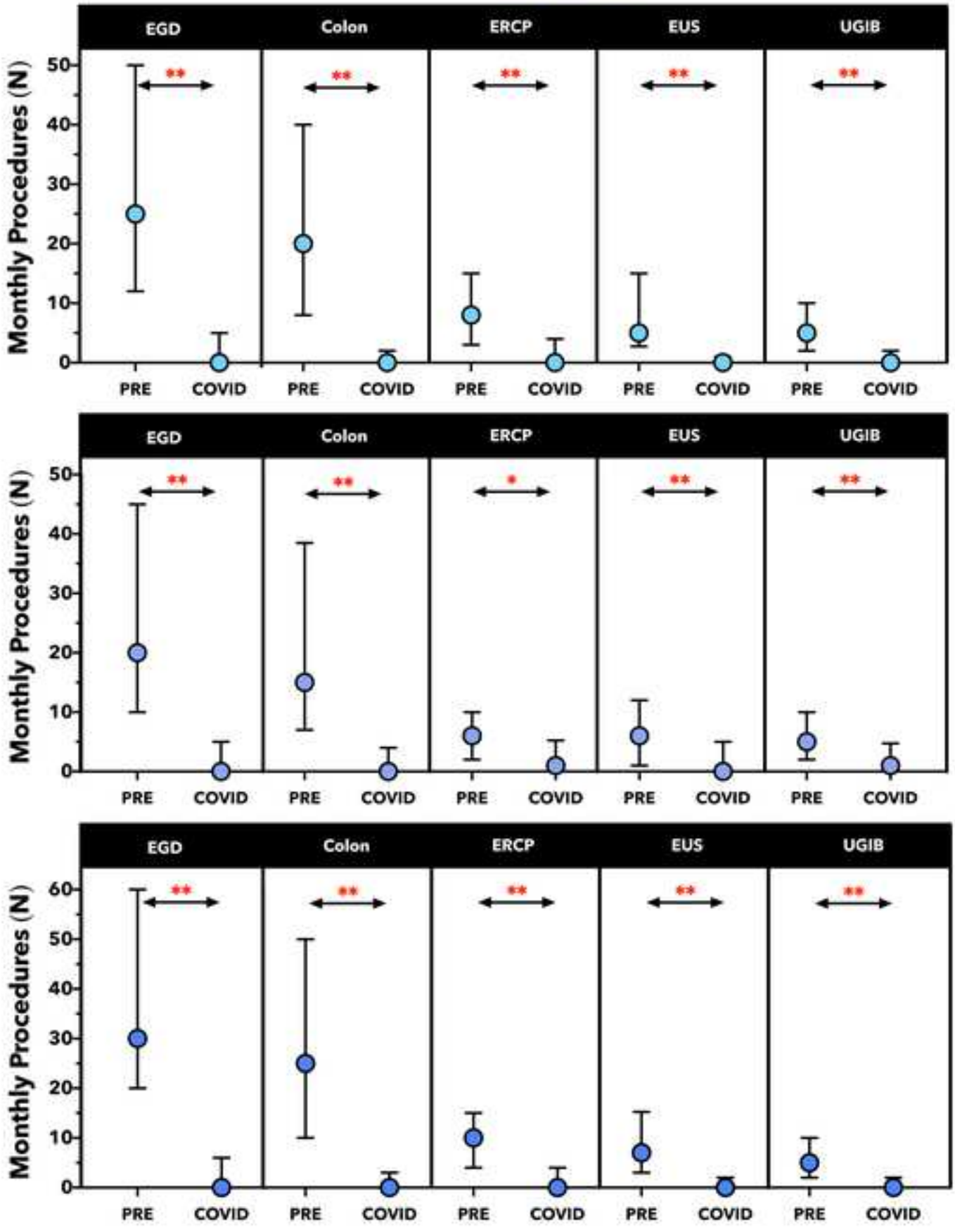


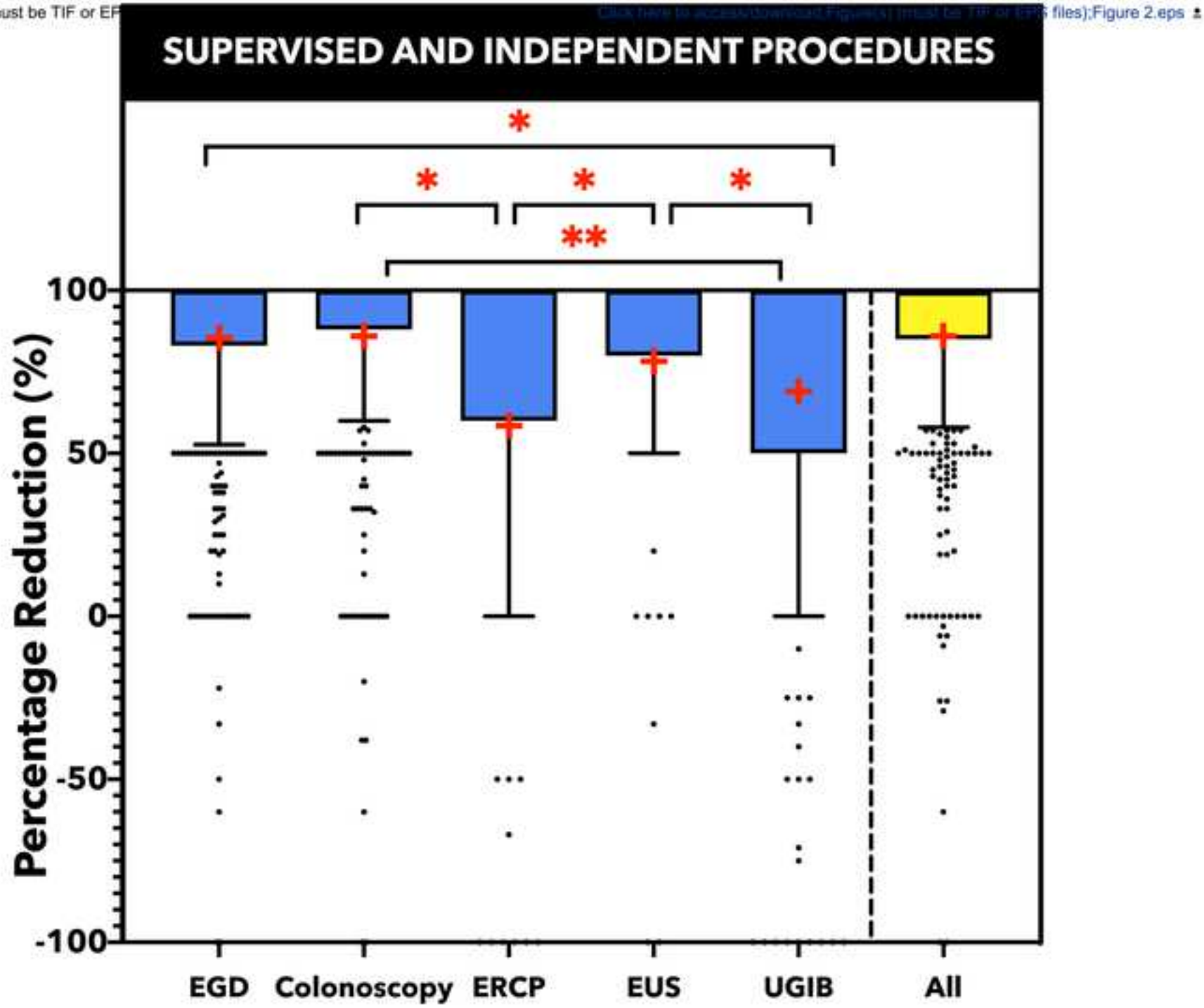
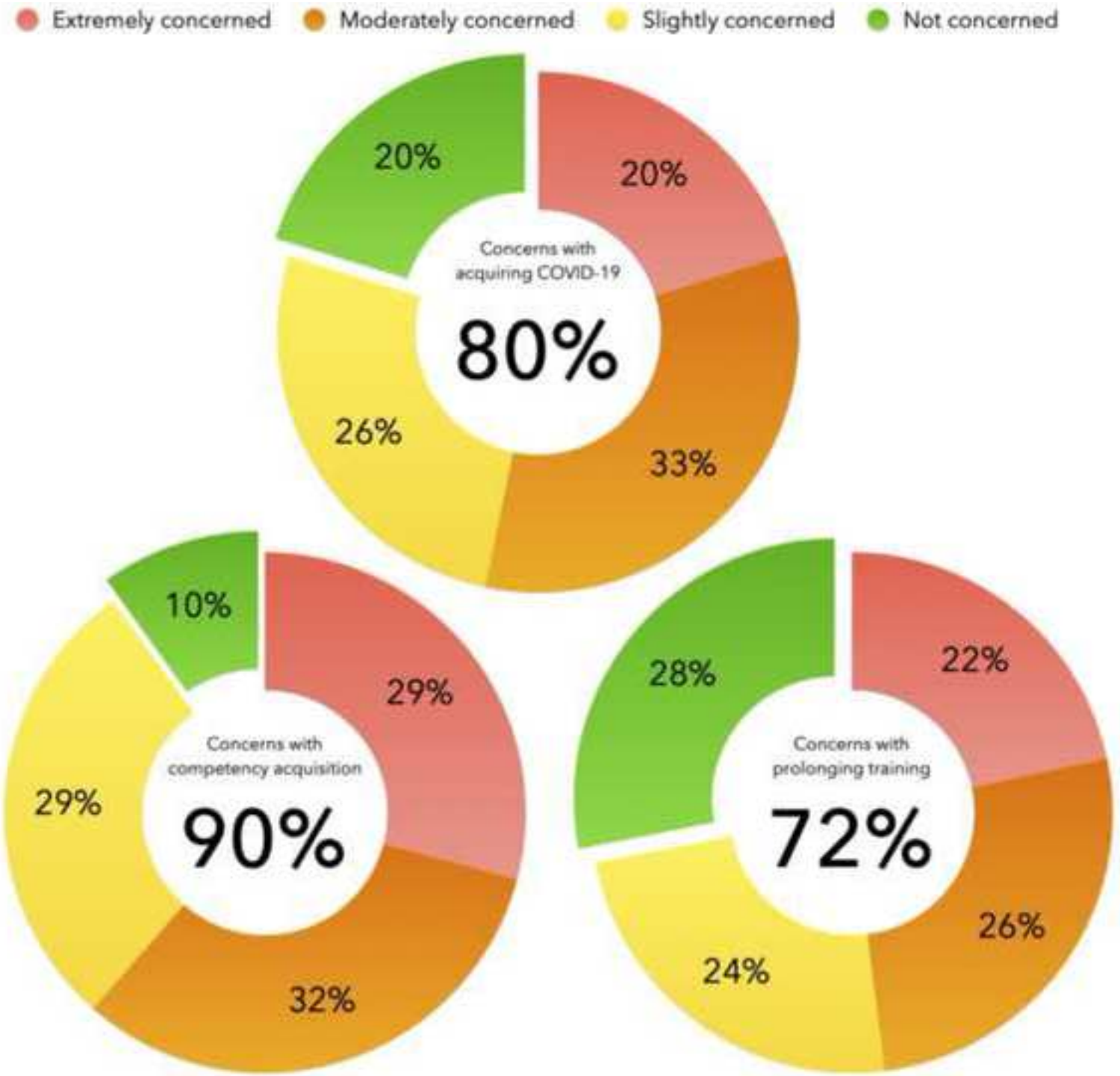


Fig 3



Suppl Fig 1

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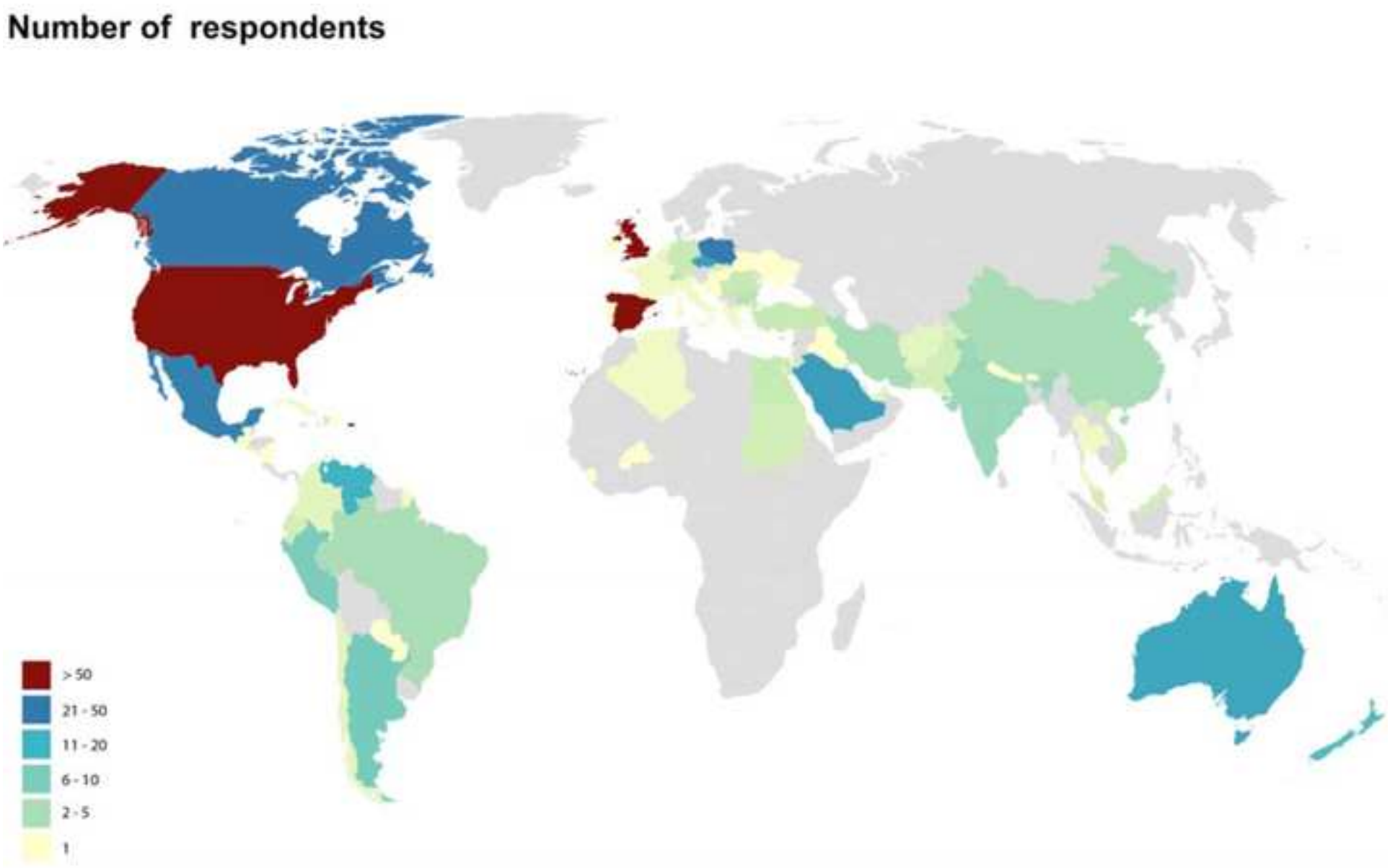

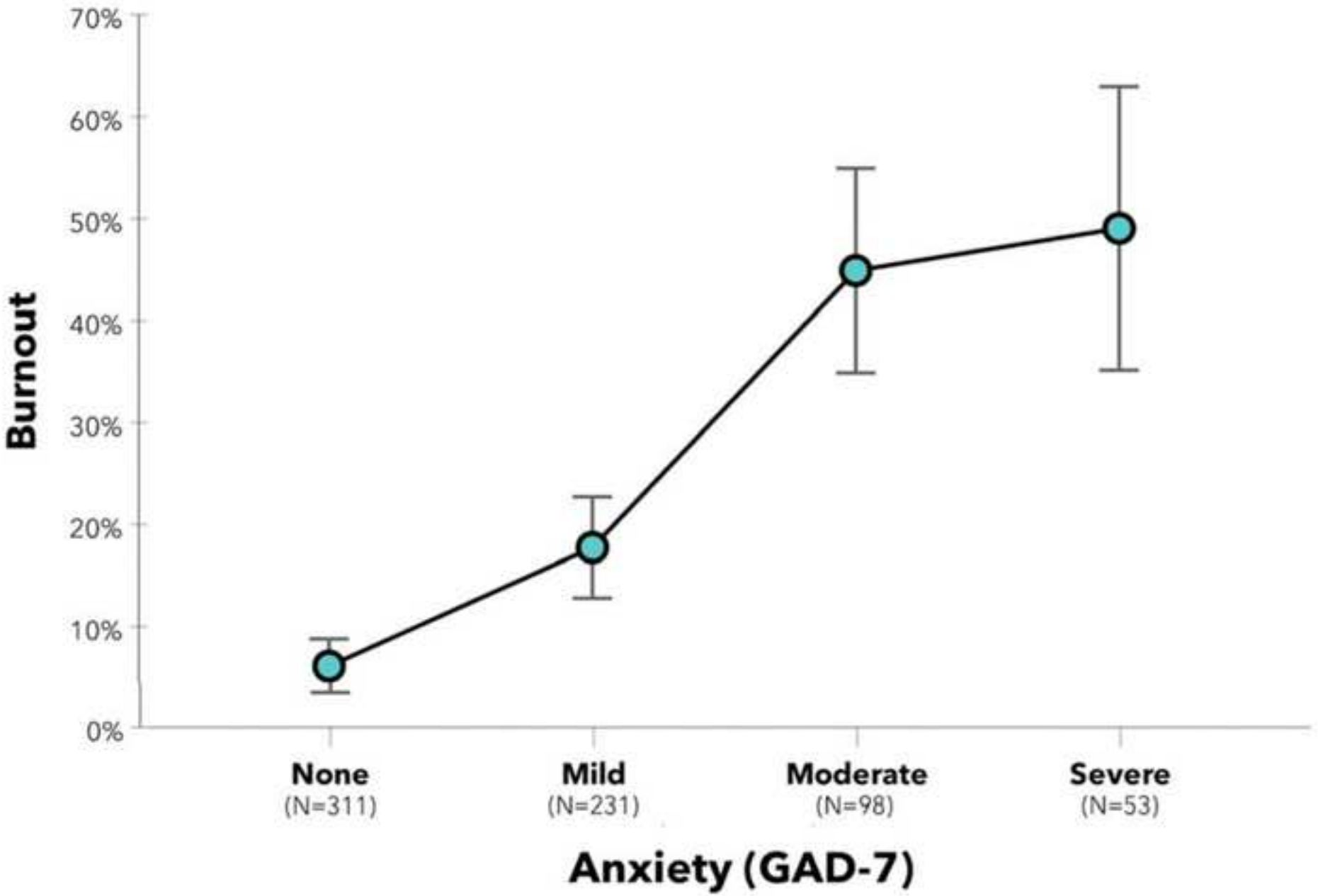

Impact of COVID-19 on endoscopy trainees: An international survey

Supplementary Digital Content

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Appendix 1: The International Training (EndoTrain) Survey

A - Demographics

1. What is your age (*optional - numerical box*)

2. Your gender (*optional*)
    a. Female
    b. Male
    c. Other (*free text option)*

3. Country of training

4. What specialty are you in?
    a. Adult gastroenterology
    b. Pediatric gastroenterology
    c. Surgery
    d. Internal Medicine
    e. Other (*free text option*)

5. Number of years in endoscopy training (*numerical box*)

6. Are you currently doing an advanced endoscopy fellowship? YES/NO

7. What is the focus of your endoscopy training program? *(Tick all that apply*)
    a. Upper GI
    b. Lower GI
    c. ERCP
    d. EUS
    e. Other (*free text*)

B – Endoscopy

8. Prior to the COVID-19 pandemic, approximately how many procedures would you perform each month **under supervision** for the following:
    a. EGD/OGD
    b. Colonoscopy
    c. ERCP
    d. EUS
    e. Therapy for Upper GI bleed

9. Prior to the COVID-19 pandemic, approximately how many procedures would you perform each month **independently** (without supervision within the room) for the following: (*numerical box, default value set at 0*)
    a. EGD/OGD
    b. Colonoscopy
    c. ERCP
    d. EUS
    e. Therapy for Upper GI bleed

10. Has your exposure to endoscopy cases decreased during the COVID-19 pandemic?
    a. YES (if Yes, please indicate the reason(s) for decreased endosocpy case volume- tick all that apply)
        i. Lack of cases
        ii. Lack of PPE availability
        iii. Personal decision
        iv. Institutional policy
        v. Redeployed to another clinical area
        vi. Other (specify [free text comment]
    b. NO

11. Which endoscopy opportunities still remain for you? (tick all that applies)
    a. None (not performing endoscopy)
    b. No restrictions
    c. Only procedures which I can perform without supervision
    d. Only patients at low-risk/negative for COVID-19
    e. ICU cases
    f. Emergency cases
    g. Other (*free text comment*)

12. Prior to the COVID-19 pandemic, did you participate in an emergency (on-call) endoscopy rota/schedule?
    a. YES – If Yes, since COVID-19, has this:

i. Stopped
ii. Reduced infrequency
iii. Remain unchanged

b. NO

13. How has your institution's case volume been affected by the COVID-19 pandemic?
    a. Not affected
    b. Yes, but don't know
    c. Decreased by 1-25%
    d. Decreased by 26-50%
    e. Decreased by 51-75%
    f. Decreased by 76-99%
    g. Decreased by 100% (no endoscopy being performed at all)

14. During the COVID-19 pandemic, approximately how many procedures are you performing each month **under supervision** for the following: (*numerical box, default value set at 0*)
    a. EGD/OGD
    b. Colonoscopy
    c. ERCP
    d. EUS
    e. Therapy for Upper GI bleed

15. During the COVID-19 pandemic, approximately how many procedures are you performing each month **independently for** the following: (*numerical box, default value set at 0*)
    a. EGD/OGD
    b. Colonoscopy
    c. ERCP
    d. EUS
    e. Therapy for Upper GI bleed

D – PPE

16. Have you received any training on appropriate use of PPE for COVID-19 patients?
    a. YES
    b. NO

17. Have you received any training on how to manage a COVID-19 patient in your endoscopy unit?
    a. YES
        i. In person
        ii. By virtual meeting
        iii. By written communication
    b. NO

18. Do you feel that the level of PPE used in your endoscopy unit during the COVID-19 pandemic is adequate?
    a. YES
    b. NO

19. Has your institution restricted endoscopy volume because of insufficient PPE?
    a. YES
    b. NO

20. Does your endoscopy unit follow guidelines for protection against COVID-19?
    a. YES (pick one)
        i. National
        ii. Societal
        iii. Hospital's own recommendations
    b. NO

E – Well Being

21. Have you taken time off work because of confirmed or suspected COVID-19?
    a. YES
        i. For Myself
        ii. For a household member
    b. NO

22. Have you tested positive for COVID-19?
    a. YES

b. NO
c. Not tested
d. Prefer not to answer

23. How concerned are you about COVID-19 exposure during your current endoscopy training?
    a. Not concerned
    b. Slightly concerned
    c. Moderately concerned
    d. Extremely concerned
    e. N/A (not training)

24. How concerned are you that the COVID-19 pandemic is going to affect your competency in performing endoscopy?
    a. Not concerned
    b. Slightly concerned
    c. Moderately concerned
    d. Extremely concerned

25. Are you concerned that the impact of COVID-19 on endoscopy training may prolong your fellowship/specialty training?
    a. Not concerned
    b. Slightly concerned
    c. Moderately concerned
    d. Extremely concerned

26. Over the last 2 weeks, how often have you been affected by the following: (*responses: Not at all, Several days, Over half of the days, Nearly every da*y)
    a. Feeling nervous, anxious or on edge
    b. Not being able to stop or control worrying
    c. Worrying too much about different things
    d. Trouble relaxing
    e. Being so restless that it is hard to sit still
    f. Becoming easily annoyed or irritable
    g. Feeling afraid as if something awful might happen
    h. Feeling loss of control
    i. Not being able to focus on work
    j. Anxiety of yourself or a loved one getting ill from COVID-19

27. During this COVID-19 pandemic, how difficult is it for you to be yourself with others?
    a. Not difficult at all
    b. Somewhat difficult
    c. Very difficult
    d. Extremely difficult

28. Overall, how would you rate your level of burnout? (*select the most appropriate statement*)
    a. I enjoy my work and have no symptoms of burnout
    b. Occasionally I am under stress, and I don't always have as much energy as I once did, but don't feel burned out
    c. I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion
    d. The symptoms of burnout that I'm experiencing won't go away. I think about frustration at work a lot
    e. I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help

29. Is your institution/program offering emotional or mental health support during these times?
    a. Yes
        i. Formal group or individual session
        ii. Drop-in sessions
        iii. Yes, but did not access
    b. No

F – Education

30. If the COVID-19 pandemic has impacted your hands-on endoscopy training, what additional training have you undertaken to supplement your endoscopy education? (*responses: 1) Have not used, 2) 1-2 times in the last month, 3) Weekly, 4) 1-2 times per week, 5) 3-5 times per week, 6) Daily)*
    a. Physically attending organised teaching from your institution
    b. Distance learning from your institution
    c. Online courses from national/international societies
    d. Social media education
    e. Endoscopy journals (including electronic)
    f. Webinars
    g. Other (free-text)

31. Do you believe that your national/societal guidelines should be modified to support endoscopy training during COVID-19?
    a. Yes (please feel free to comment -*option for free text*)
    b. No

32. Do you have any additional comments or suggestions on how to improve training during the COVID-19 pandemic? (optional)

Appendix 2: List of societies that supported dissemination of the survey

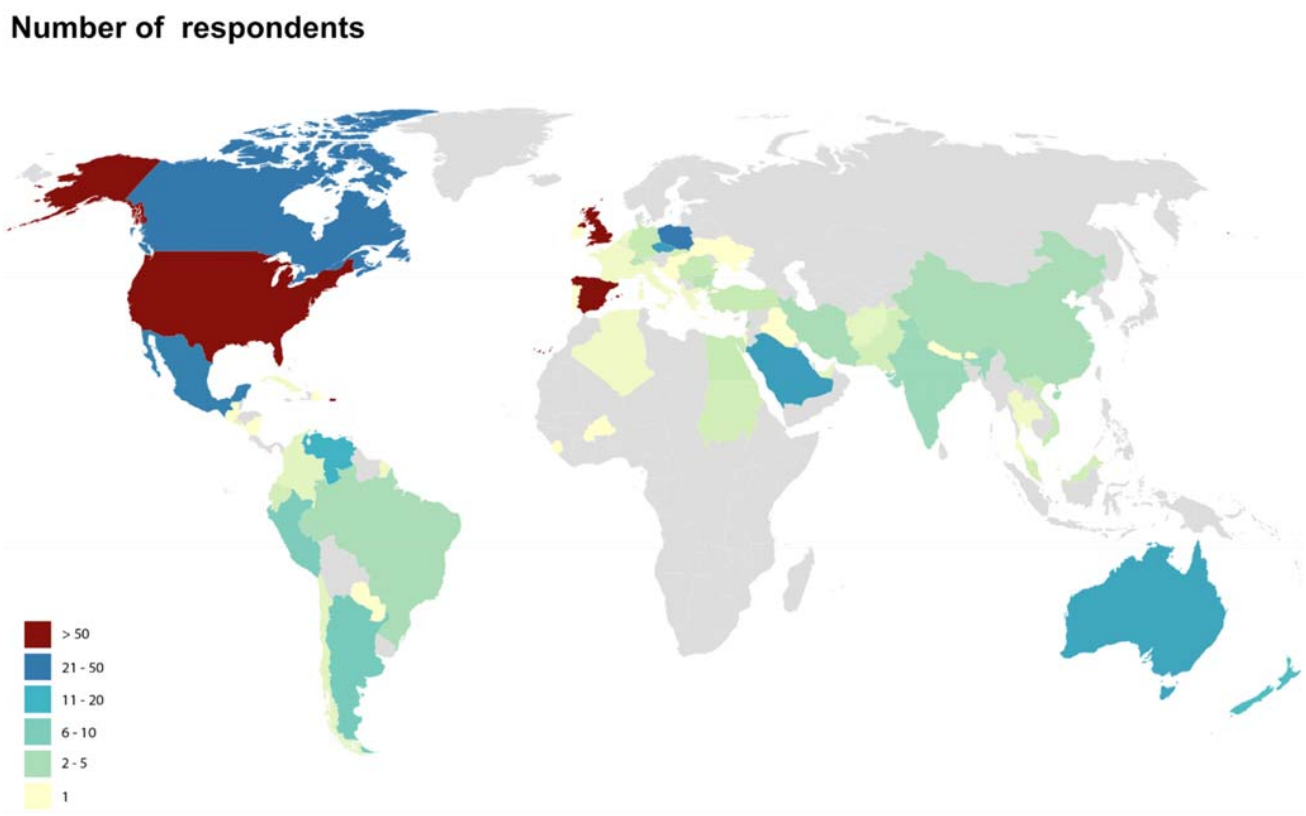
Society/ Group	
America • Pan American Crohn's and Colitis Organization (PANCCO) **North America** • Adult Gastroenterology, Pediatric Gastroenterology and Surgery Program Directors across North America • Canadian Association of Gastroenterology (CAG) • The American College of Gastroenterology (ACG) • The American Gastroenterological Association (AGA) • GI Training Group of North America **Latin America** • Adult Gastroenterology, Pediatric Gastroenterology and Surgery Program Directors across Latin America • Chilean Endoscopy Association/Asociación Chilena de Endoscopia Digestiva (ACHED) • Endoscopy Society of El Salvador • Gastroenterology Society of Argentina/Sociedad Argentina de Gastroenterologia (SAGE) • Gastrointestinal Endoscopy Program Directors in Mexico • Mexican Association of Gastroenterology/Asociación Mexicana de Gastroenterología (AMG) • Mexican Association of Gastrointestinal Endoscopy/Asociación • Mexicana de Endoscopia Gastrointestinal (AMEG) • Peruvian Society of Gastroenterology/Sociedad Peruana de Gastroenterologia (SGP) • Venezuelan Society of Gastroenterology • Young Trainee Group of Argentina, Brazil, Chile, Colombia, Venezuela • TG of El Salvador, Panamá	**Asia** • Gastrointestinal Society of Kuwait • Philippine Society of Digestive Endoscopy (PSDE) • Saudi Gastroenterology Association (SGA) • The Asian-Pacific Association of Gastroenterology (APAGE) • The Asian-Pacific Society of Digestive Endoscopy (APSDE) • Kuwait Gastroenterology Association (KGA) • The Hong Kong Society of Gastroenterology • The Japan Gastroenterological Endoscopy Society (JGES) • The Society of Gastrointestinal Endoscopy of India (SGEI) **Australia & New Zealand** • Gastroenterological Society of Australia (GESA) Young Group • New Zealand Society of Gastroenterology (NZSG) **Europe** • Czech Gastroenterological Society (ČGS) • Czech Young Trainee Group • Junge Gastroenterolloge Arbiettsgruppe (JUGA) • European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) • Polish Society of Young Endoscopist • Spanish Association of Gastroenterology/Asociación Española de Gastroenterologia (AEG) • Spanish Association of Digestive Endoscopy/Sociedad Española de Endoscopia Digestiva (SEED) • The British Society of Gastroenterology (BSG)

Appendix 3: List of countries with respondents

Country	Number of Responses	Percent
Afghanistan	3	0.39
Albania	2	0.26
Algeria	2	0.26
Argentina	11	1.43
Australia	23	2.99
Barbados	2	0.26
Belgium	3	0.39
Bhutan	1	0.13
Bosnia and Herzegovina	1	0.13
Brazil	7	0.91
Bulgaria	6	0.78
Burkina Faso	1	0.13
Canada	34	4.42
Chile	3	0.39
China	7	0.91
Colombia	3	0.39
Croatia	1	0.13
Cuba	2	0.26
Czech Republic	25	3.25
Dominican Republic	1	0.13
Ecuador	4	0.52
Egypt	5	0.65
El Salvador	3	0.39
France	2	0.26
Germany	5	0.65
Greece	2	0.26
Guatemala	1	0.13
Hungary	1	0.13
India	8	1.04
Iran (Islamic Republic of)	7	0.91
Iraq	1	0.13
Ireland	1	0.13

Country	Number of Responses	Percent
Israel	1	0.13
Italy	2	0.26
Lebanon	8	1.04
Malaysia	4	0.52
Mexico	31	4.03
Nepal	1	0.13
Netherlands	2	0.26
New Zealand	17	2.21
Nicaragua	1	0.13
Pakistan	4	0.52
Paraguay	1	0.13
Peru	10	1.30
Poland	33	4.29
Portugal	1	0.13
Romania	5	0.65
Saudi Arabia	25	3.25
Serbia	5	0.65
Sierra Leone	1	0.13
Singapore	6	0.78
Slovakia	4	0.52
Spain	82	10.65
Sudan	4	0.52
Switzerland	6	0.78
Thailand	2	0.26
Turkey	5	0.65
Ukraine	1	0.13
United Arab Emirates	3	0.39
United Kingdom of Great Britain	132	17.14
United States of America	169	21.95
Venezuela (Bolivarian Republic of)	20	2.60
Vietnam	5	0.65
Total	770	100.00

Appendix 4: International distribution of EndoTrain survey respondents



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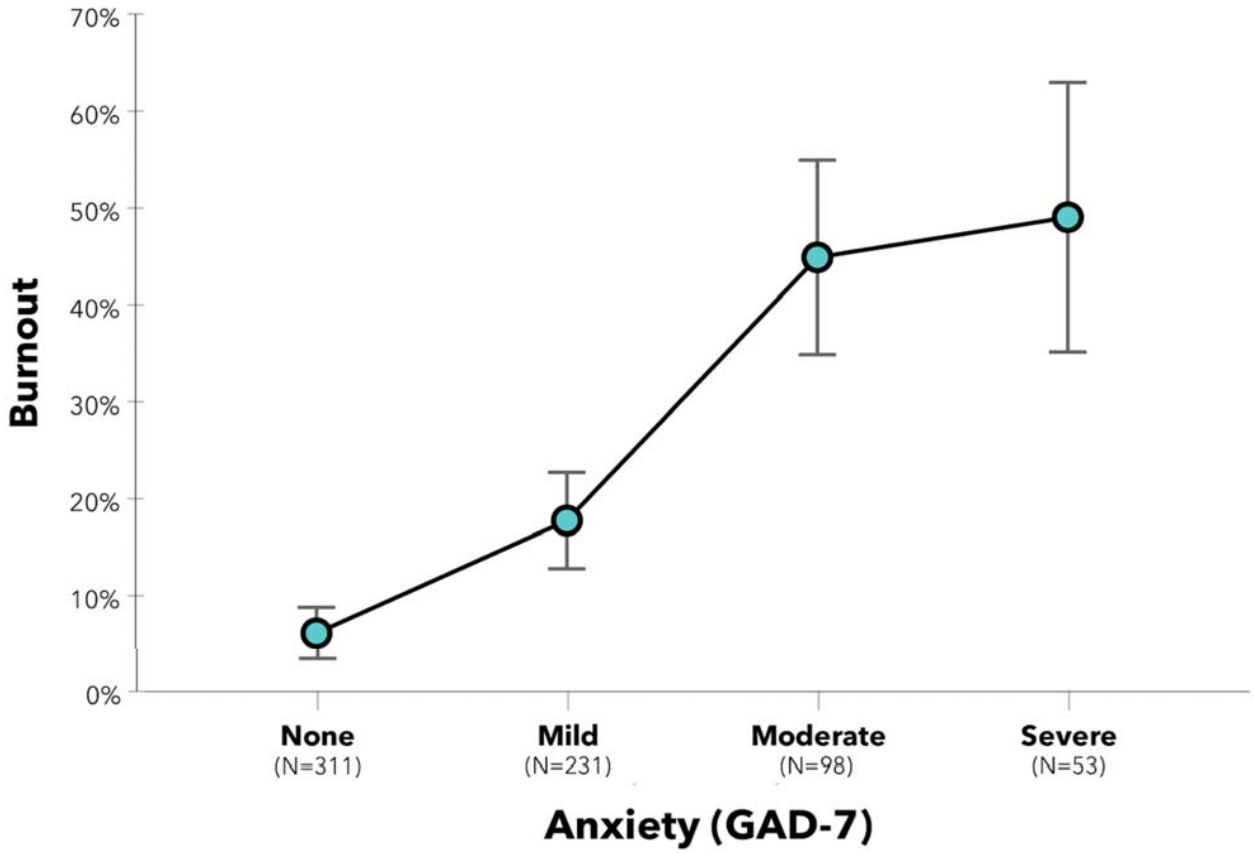

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Date: **7th June 2020**

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