

1. Project summary

The performance of endoscopic procedures has assumed increasing importance in the career of gastroenterologists and is characterized by frequent, repetitive activities sometimes performed in awkward positions. Nevertheless, very little information is available regarding the frequency and importance of endoscopy-associated musculoskeletal injury. Existing evidence suggests that endoscopists frequently report a variety of musculoskeletal problems including neck pain, low back pain, and thumb and hand pain. The present widespread use of esophagogastroduodenoscopy and colonoscopy implies that endoscopists may perform more procedures on a daily basis than in the past. Furthermore, the burden and performance of more technically challenging procedures may predispose endoscopists to higher rates of repetitive stress injuries than previously reported. On the other hand, despite previous American and Asian data, to our knowledge little evidence has come from European countries to the matter in question. Therefore, we aim to perform a survey among Portuguese endoscopists in order to determine the prevalence and type of musculoskeletal injuries related to the practice of digestive endoscopy. We also want to identify risk factors related to the development of musculoskeletal injuries and to evaluate the impact of the occurrence of this type of lesions.

2. Project

a. Title

Prevalence, risk factors and impact of musculoskeletal injuries among endoscopists in Portugal

b. Authors

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c. Funding

Non-applicable

3. Objectives and Project rationale

Occupationally induced musculoskeletal injuries have become a widespread problem among many health care professionals^{1,2}. Repetitive movements, static muscle loading and awkward body posture are the most common causes of musculoskeletal injury³. Evidence suggests that physicians incur in occupational injuries by performing procedures on a repetitive basis. Occupational injuries resulting from such activities have been shown to have a negative influence in work productivity and longevity. According to the United States Department of Labor statistics from 2003, for every 10,000 full-time workers, the rate of occupation-related sprains, strains, and tears is 64.3 and the median time of work lost per year for these conditions is 8 days⁴. Gastrointestinal (GI) endoscopy remains the cornerstone of screening, investigation and treatment of several GI conditions, with an ever-increasing number of procedures performed worldwide^{5,6}. Therefore, conventional flexible GI endoscopy makes up a significant proportion of the workload for gastroenterologists; this demand for GI endoscopy is only set to increase with, for example, the ever increased pressing for a bigger reach of cancer screening programmes, or a growing number of previously surgical procedures which can now be carried out endoscopically⁶. The performance of endoscopic procedures has assumed increasing importance in the career of gastroenterologists and is characterized by frequent, repetitive activities sometimes performed in awkward positions. Although several studies and clinical audits have been carried out on patient safety and tolerance of GI endoscopy, there are remarkably less data on the safety and comfort of endoscopists themselves. Several studies have suggested a high prevalence of musculoskeletal injuries among endoscopists⁷⁻¹². A systematic review estimated that 37% to 89% of endoscopists develop work-related injuries¹³. Commonly reported areas of pain were the back (15-57%), neck (9-46%), shoulders (9- 19%), elbows (8-15%) and hands/fingers (14-82%)¹⁴. A more recent study among active members of the American Society for Gastrointestinal Endoscopy (ASGE) reported that 53% of the endoscopists had an injury related to endoscopy and identified higher procedure volume, greater number of hours per week spent performing endoscopy and total number of years performing endoscopy as factors associated with a higher rate of endoscopy-related injury¹⁵. Nevertheless ergonomic factors like bad posture during the procedure⁹ or poor ergonomic design of facilities⁷

have also been related to the development of endoscopy-related musculoskeletal symptoms.

The present widespread use of EGD and colonoscopy implies that endoscopists may perform more procedures on a daily basis than in the past. Furthermore, the burden and performance of more technically challenging procedures such as ERCP, EUS, device-assisted enteroscopy, ESD or EMR may predispose endoscopists to higher rates of repetitive stress injuries than previously reported¹⁵.

Interestingly, in contrast to the high proportions of pain and injury reported by endoscopists, few reported seeking early intervention or making modifications to their practice to reduce the impact of injury, and an even more reduced number reported taking time off work¹⁴. This may to some extent reflect reticence on the part of the endoscopists to seek professional help or the high volume of their workloads, underscoring the need to gain a better understanding of ergonomics and make appropriate modifications to practice and equipment. Since presence of musculoskeletal injuries can potentially have a negative impact on performance at work and quality of life⁹, such measures would potentially extend the career lifespan of endoscopists and help to retain endoscopists in the face of ever-increasing demand.

On the other hand, despite previous American^{7,15}, Korean⁹ and Japanese¹¹ reports on this topic, to our knowledge little evidence has come from European countries to the matter in question. Therefore, our main aim is to determine the prevalence and type of musculoskeletal injuries related to the practice of digestive endoscopy among Portuguese endoscopists. We also want to identify risk factors related to the development of musculoskeletal injuries and to evaluate the impact and limitation in the regular and labor activity of the occurrence of this type of lesions.

4. Material and methods

a. Type of study

Survey

b. Participants selection

We plan to conduct an electronic survey of endoscopists who are members of the Sociedade Portuguesa de Gastrenterologia (SPG), with registered e-mail addresses. Members who currently perform or have ever performed endoscopy are eligible to

participate. At least one year of endoscopy practice is required for participation in the study. Informed consent is implied by response to the survey.

c. Sample size

Electronic survey will be sent to all members of SPG (n=700). We expect a response rate of 50% for a total number of participants of 350.

d. Survey

The survey is a 35 question, self-administered, electronic survey that was developed by a multidisciplinary group consisting of gastroenterologists, physiatrist and occupational medicine experts. The survey items were generated based on a review of the literature and interviews with the mentioned specialists. We previously performed a critical evaluation of the survey by “field-test” among endoscopists in our institution in order to evaluate the content, completeness and clarity of the questions.

The final survey, constructed into a web-based format, plans to measure endoscopist characteristics (including age, sex, height, weight, hand dominance, glove size, physical activity level, practice setting), workload parameters (number of years of current/past practice, hours and number of endoscopic procedures per week, type of endoscopic procedure performed and proportion of time spent performing different procedures), injury experiences (location of pain or injury, severity of worst pain assessed by Numerical Rating Scale (NRS), effect of injury on work and leisure activities, modifications of practice, required medical/surgical treatments) and environmental factors affecting endoscopic procedures (use of height-adjustable examination table, position of the monitor directly in front of the endoscopist).

Survey administration

Subjects will be contacted via e-mail to participate. The initial e-mail will include a cover letter explaining the study and a link to the survey web site. A first reminder e-mail will be sent to participants who have not yet responded within 2 weeks after the initial e-mail. A second reminder e-mail will be sent to those having not responded within 4 weeks. No additional reminders will be sent. All answers will remain anonymous to minimize the potential for response bias. Responders will not be remunerated for their participation.

e. Variables

A draft of the survey instrument is described below.

1. Sex

Male__ Female__

2. Age

___years

3. Height

___ cm

4. Weight

___kilograms

5. Hand dominance

Right__ Left__ Ambidextrous__

6. Glove size

S__ M__ L__ XL__

7. Activity level

Very (6-7 days per week) __ Moderately (3-5 days per week) __ Minimally (1-3 days per week) __ Sedentary (little to no exercise) __

8. Do you currently perform endoscopic procedures?

Yes__ No__

9. Number of years performing endoscopy

___years

10. What is your experience?

Trainee__ Specialist__

11. Describe the place where you perform endoscopy.

Central public hospital__ Peripheral public hospital__ Private hospital/clinic__ Central public hospital + Private hospital/clinic__ Peripheral public hospital + Private hospital/clinic__

12. How many hours do you usually work every week? ___hours

13. How many hours do you usually spend performing endoscopic procedures every week?

___hours

14. What type of endoscopic procedures do you usually perform? (More than one option can be selected)

Upper endoscopy___ Colonoscopy___ ERCP___ EUS___ Enteroscopy___

15. Do you usually perform any of the following endoscopic therapeutic procedures? (More than one option can be selected)

EMR___ ESD___ Upper GI/Lower GI stent placement___ Upper GI/Lower GI dilation___
PEG___ None___

16. Of the time you spend doing endoscopy, what percentage (%) do you spend doing the following:

EGD___ Colonoscopy___ ERCP___ EUS___ Enteroscopy___

17. What percentage (%) of endoscopic procedures are performed with general anesthesia?

___ %

18. Have you ever experienced injury (pain, numbness, aching) in your neck, back, or upper or lower limbs?

Yes___ No___

Details about injury.

19. Type of injury (More than one option can be selected)

Thumb pain___ Shoulder Pain___ Elbow pain___ Hand pain___ Neck/upper back pain___
Lower back pain___ Hand numbness___ Carpal tunnel syndrome___ Other___

Specify other: _____

20. Was this injury caused by endoscopy?

Yes___ No___ Maybe___

21. When was/is this pain evident?

At work, only performing endoscopy___ At work, performing endoscopy or clinic___ At work and outside work___ Only at outside work___ All the time, including at rest___

22. Classify the worst felt pain caused by injury (1-10, 10 being worst possible pain)

23. How long have you had these symptoms?

___ years

24. Have you ever had to take time off from performing endoscopy because of musculoskeletal injured related to endoscopy?

Yes___ No___

25. How many years after starting endoscopy did you first experience musculoskeletal injured related to endoscopy?

___ years

26. If yes, what is the longest consecutive amount of time you have taken off work because of musculoskeletal injured related to endoscopy?

___ days

27. What is total amount of time you have taken off work because of musculoskeletal injured related to endoscopy?

___ days

28. Have you ever had to modify your practice and/or shorten your endoscopic case load due to occupational injury?

Yes___ No___

29. If you experienced musculoskeletal pain/injury related to endoscopy, did you made modifications to your endoscopic technique?

Yes___ Couldn't change endoscopic technique___ Didn't try to change endoscopic technique___

30. If you experienced musculoskeletal pain/injury related to endoscopy, what modifications have you made to your endoscopic practice? (More than one option can be selected)

None__ Stretch before endoscopy__ More breaks between procedures__ Adjustable bed__ Less endoscopy__ Orthopedic shoes/sneakers__

31. What treatment(s) have you received for your condition? (More than one option can be selected)

None__ Medications (NSAIDs, paracetamol)__ Steroid injections__ Physiotherapy__ Rest__ Splinting__ Surgery__

32. Did you have to reduce your physical activity outside of work (work at home, hobbies) due to musculoskeletal pain/injury related to endoscopy?

Yes__ No__

33. How often do you take breaks during endoscopy practice?

Regularly__ Occasionally__ Never__

34. Do you perform any of these environmental modifications during endoscopy?

None__ Height-adjustable examination table__ Position of monitor in front at eye level__ Stopped helping to move patients during/after procedures__ Sit when you perform endoscopy__

35. Would you be interested in having your workplace ergonomically assessed or in receiving preventive information regarding risk of musculoskeletal pain/injury related to endoscopy?

Yes__ No__

f. Statistical analysis

All data will be arranged, processed and analyzed with SPSS ® v.24.0 data (Statistical Package for Social Sciences). Categorical variables will be described through absolute and relative frequencies and continuous variables as mean and standard deviation, median, percentiles, minimum and maximum. Hypotheses will be tested about the distribution of continuous variables by using the independent sample t-test/one-way Anova or nonparametric Mann-Whitney and Kruskal-Wallis test, depending if normal or non-normal distribution, respectively, and considering the nature of the hypothesis. All hypotheses will be tested at 5% level of significance.

5. Project chronogram

- 1st month
 - Survey data collection
- Last 2 months
 - Statistical analysis
 - Description and interpretation of final results, evaluation of the project, conclusions achieved, paper writing, dissemination of results (conferences and publications)

6. Expected results

- Evaluate the prevalence and type of musculoskeletal injuries related to endoscopy practice among endoscopists in Portugal
- Identify risk factors associated with a higher rate of endoscopy-related musculoskeletal injuries
- Identify possible modifiable intrinsic and extrinsic factors related to the development of endoscopy-related musculoskeletal injuries
- Evaluate the impact of endoscopy-related musculoskeletal injuries in endoscopic practice and daily activities

7. Ethical considerations

The study was approved by the Medical Ethics Committee of Centro Hospitalar São João.

8. Informed consent for participants

“Performing endoscopic procedures has assumed increasing importance in the career of gastroenterologists and is characterized by frequent and repetitive physical activities. However, there is little information available on the frequency and importance of the development of musculoskeletal injuries associated with endoscopy. Existing evidence suggests that endoscopists often report a variety of musculoskeletal injuries, including neck pain, low back pain, and pain in the thumb or hands. The widespread use of esophagogastroduodenoscopy and colonoscopy implies that endoscopists have

to perform more and more procedures daily than in the past. In addition, the emergence and performance of technically more challenging endoscopic procedures may predispose endoscopists to higher rates of repetitive strain injury.

With the present questionnaire we intend to determine the prevalence and type of musculoskeletal injuries related to the practice of digestive endoscopy, to identify risk factors for its development and to evaluate the impact of the occurrence of this type of lesions.

The questionnaire is confidential, not requiring identification of the participant. It consists of 35 questions taking about 15 minutes to respond.”

9. Budget estimate

Website creation, online survey instrument, statistical analysis (500 euros)

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