Prevalence and risk factors for musculoskeletal injuries related to endoscopy

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Background: There are limited data regarding work-related injury among endoscopists.

Objective: To define the prevalence of endoscopy-related musculoskeletal injuries and their impact on clinical practice and to identify physician and practice characteristics associated with their development.

Design: Survey.

Setting: Electronic survey of active members of the American Society for Gastrointestinal Endoscopy with registered e-mail addresses.

Participants: Physicians who currently or ever performed endoscopy and responded to the survey between February 2013 and November 2013.

Intervention: A 25-question, self-administered, electronic survey.

Main Outcome Measurements: Prevalence, location, and ramifications of work-related injuries and endoscopist characteristics and workload parameters associated with endoscopy-related injury.

Results: The survey was completed by 684 endoscopists. Of those, 362 (53%) experienced a musculoskeletal injury perceived definitely (n = 204) or possibly (n = 158) related to endoscopy. Factors associated with a higher rate of endoscopy-related injury included higher procedure volume (>20 cases/week; $P < .001$), greater number of hours per week spent performing endoscopy (>16 hours/week; $P < .001$), and total number of years performing endoscopy ($P = .004$). The most common sites of injury were neck and/or upper back (29%) and thumb (28%). Only 55% of injured endoscopists used practice modifications in response to injuries. Specific treatments included medications (57%), steroid injection (27%), physiotherapy (45%), rest (34%), splinting (23%), and surgery (13%).

Limitations: Self-reported data of endoscopy-related injury.

Conclusion: Among endoscopists there is a high prevalence of injuries definitely or potentially related to endoscopy. Higher procedure volume, more time doing endoscopy per week, and cumulative years performing endoscopy are associated with more work-related injuries. (Gastrointest Endosc 2015;81:294-302.)

Several studies have suggested a high prevalence of musculoskeletal injuries among endoscopists.[1-6] However, these studies were conducted when procedure volumes and the complexity of endoscopic therapies were typically lower.[7,8] Further, data from Western populations of endoscopists are limited, and a robust analysis

Abbreviations: ACGIH, American Conference of Industrial Hygienists; ASGE, American Society for Gastrointestinal Endoscopy.

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to identify risk factors (endoscopist and practice) associated with endoscopy-related injury is lacking. Endoscopists are presumably at risk for overuse syndromes because of the repetitive movements and potentially awkward posture associated with endoscopy. Based on earlier reports,[1-3,6,9-11] a systemic review estimated that 37% to 89% of endoscopists develop work-related injuries.[12] Moreover, suspected risk factors included repetitive hand motion, high hand forces, and awkward wrist, shoulder, and neck postures.[12] However, previous studies of work-related injury among endoscopists have been limited by small sample sizes and limited analysis of risk factors.

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, and others may predispose endoscopists to higher rates of repetitive stress injuries than previously reported. Therefore, our primary aim was to define the prevalence and types of endoscopy-related musculoskeletal injuries in the current era of high-volume endoscopy with advanced therapeutics. Second, we evaluated endoscopist and practice characteristics associated with these injuries.

METHODS

Survey sampling

We conducted an electronic survey of endoscopists who were active members of the American Society for Gastrointestinal Endoscopy (ASGE) with registered e-mail addresses (n = 5239) between February 2013 and November 2013. Members who currently perform or ever have performed endoscopy (by self-report) were eligible to participate. Informed consent was implied by response to the survey. Before dissemination of the survey, our institutional review board approved the study.

Survey instrument

The survey was a 25-question, self-administered, electronic survey that was developed by 2 endoscopists (L.M., W.L.) and 1 physiatrist (R.B.) (Supplemental Table 1, available online at www.giejournal.org). The survey instrument was a modified version of a previous survey[6] conducted by our group in 1994 after being pilot tested by a small group of endoscopists.

The final survey measured endoscopist characteristics, workload parameters, and experience during and after participants endured an injury. Endoscopist characteristics included age, sex, height, weight, hand dominance, physical activity level, main avocational activities, and practice setting. Workload parameters included number of years in practice, hours and number and/or type of endoscopies per week, and proportion of time spent performing procedures. Injury experiences included location of pain or injury, the effect of the injury on work, modifications of practice, and required treatments. If the respondent had a current or prior musculoskeletal injury, its relationship to endoscopy was further characterized as definitely, possibly, or not related.

Survey data collection

Responders were invited to participate via e-mail. The introductory e-mail described the study and included a direct Web link to the online survey instrument (SurveyMonkey, Palo Alto, Calif). A first reminder e-mail was sent to participants who did not respond within 2 weeks after the initial e-mail. A second reminder e-mail was sent to those having no response within 4 weeks. All answers remained anonymous to minimize the potential for response bias. Responders were not remunerated for their participation.

Statistical analysis

We used descriptive statistics to define the prevalence of injuries definitely or potentially related to endoscopy. Responders were classified into 3 groups for analysis: those reporting an injury definitely related to endoscopy, those reporting an injury potentially related to endoscopy, and those having no injury or an injury definitely not related to endoscopy. To explore potential differences among these groups, we applied comparative statistics (the Fisher exact test for proportions and Kruskal-Wallis equality test or analysis of variance for continuous variables). Differences across groups were considered significant if the associated P value was $< .05$. In addition, we performed ordered logistic regression (because variables of interest, such as years in practice, were ordinal) to evaluate for differences in provider characteristics that may have been associated with a greater frequency of endoscopic injuries. Each variable having a P value $< .05$ on univariate analysis was incorporated into a multivariate regression model to confirm its independent association with endoscopic injury. Consistent with the practices of survey research, no correction for multiple testing was made to the P values arising from the various comparisons of data from the respondents' questionnaires. Analysis was performed by using Stata version 11.2 (StataCorp LP, College Station, Tex).

RESULTS

Prevalence and location of musculoskeletal injury

A total of 5239 e-mails were sent, and 684 individuals (13%) completed the survey and were included in the