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ATTITUDES TOWARDS ERGONOMICS IN ENDOSCOPY: A BSPGHAN ENDOSCOPY WORKING GROUP SURVEY OF PAEDIATRIC ENDOSCOPISTS IN THE UNITED KINGDOM

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ABSTRACT

Objectives: Endoscopy-related injury (ERI) is a known occupational hazard among gastroenterologists previously reported in the United States of America (USA) paediatric gastroenterology community. Data on prevalence and risk factors for ERI among United Kingdom (UK) paediatric endoscopists are unavailable. We aimed to determine the prevalence, nature, and risk factors for ERI, and explore attitudes toward and experience of ergonomics among UK paediatric gastroenterologists.

Methods: 26-point questionnaire distributed to all members of the British Society of Paediatric Gastroenterology, Hepatology, and Nutrition (BSPGHAN). Survey explored clinical experience, history of ERI, and experience with ergonomic modifications. Fisher's exact test Statistical analysis of differences in ERI rates between groups.

Results: 65 responses received (20.1% response rate). 53.8% (n=35) reported experiencing pain or injury related to endoscopy. Most common injuries were hand/digit pain (62.2%), backache (35.1%), and arm pain (24.3%). 86.2% (n=56) had never received training on ergonomics or reducing ERI. ERI rates significantly higher in female endoscopists (69.7% vs 37.5% in males, p=0.013) and respondents not performing weight/resistance exercises (68.8% vs 39.4%, p=0.025). Adherence to optimal endoscopy suite set-up not significantly associated with reduced ERI rates.

Conclusions: This is the first UK nationwide study demonstrating that ERI is a significant occupational health issue, affecting over half of paediatric endoscopists

surveyed. The significantly higher risk for women and those not performing resistance training highlights potential areas for targeted intervention. These findings underscore an urgent need for the development and integration of formal ergonomics training and guidelines into UK paediatric endoscopy practice to mitigate occupational risk.

What Is Known:

- Endoscopy-Related Injury (ERI) is a well-established occupational hazard in gastroenterology, with prevalence rates of 39-89% reported.
- Existing guidelines emphasise the importance of ergonomics to prevent ERI, and incorporating it into training.

What Is New:

- This is the first nationwide UK study on ERI in paediatric endoscopists, finding high prevalence of 53.8% of survey respondents, reflecting 10.8% of BSPGHAN's medical membership.
- ERI rates in those reporting ERI are significantly higher in female endoscopists (69.7% vs. 37.5% in males, p=0.013).
- Respondents not performing weight/resistance exercises had significantly higher ERI rates (68.8% vs. 39.4%, p=0.025).
- The majority (86.2%) have never received formal ergonomics training, highlighting a need for guidelines and interventions.

How This Study Might Affect Research, Practice, or Policy

- Provides impetus for the urgent development and integration of formal ergonomics training and guidelines into UK paediatric endoscopy practice (e.g., by BSPGHAN/ESPGHAN), addressing the current gap in European guidance.

- Highlights need for gender-specific ergonomic assessments and the promotion of resistance training as targeted injury prevention strategies for endoscopists.
- Supports the need for further objective studies (e.g., using biomechanical or robotic analysis) to establish a definitive framework for optimum clinical technique and assess the true impact of current practices.

INTRODUCTION

Ergonomics, in the context of endoscopy, refers to the study and optimisation of an endoscopist's interaction with their endoscopy environment, to reduce the rate of work-related injury[1]. Endoscopy is an important tool in the diagnosis and ruling out gastrointestinal (GI) pathology in the paediatric population, and forms a significant proportion of the workload of paediatric gastroenterologists. However, there exists a risk of occupational injury – endoscopy-related injury (ERI) – with endoscopy, the prevalence of which has been established in adult gastroenterology, with 39-89% of endoscopists reporting pain and injury associated with endoscopy[2–5]. Indeed, this has also been studied in paediatric gastroenterologists in the USA, where injury directly attributable to endoscopy is reported in 34.7% of paediatric endoscopists surveyed[6]. To date, there are no available data on this subject amongst the paediatric gastroenterology community in the United Kingdom (UK). The importance of integrating systematic safety management systems in order to reduce the risks of occupational hazards, specifically in endoscopy, has been highlighted in the literature[7], and considering increasing awareness of this issue, the American Society for Gastrointestinal Endoscopy (ASGE) developed guidelines for prevention of ERI as well as a core curriculum presenting best practice recommendations for ergonomics in endoscopy, which highlight the importance of optimisation of factors such as posture, positioning, room set-up, and appropriate equipment handling in paediatric endoscopy[1,8,9]. Additionally, there exist published guidelines specifically focusing on the importance of implementing ergonomics into endoscopy training at a Fellowship level[10]. However, European Society of Gastrointestinal Endoscopy/European Society of Paediatric Gastroenterology, Hepatology, and Nutrition (ESGE/ESPGHAN) joint guidelines on paediatric endoscopy do not cover

ergonomics and there exists no similar guidance for the European audience[11]. We aimed to explore and outline attitudes towards and experience of ergonomics in endoscopy amongst paediatric gastroenterologists in the UK. Alongside this, we aimed to ascertain the prevalence, nature, and risk factors for ERI in amongst UK paediatric endoscopists.

METHODS

Ethics Statement:

Ethics approval was not sought for this study as it was deemed a service evaluation and quality improvement project (QIP) based on a survey of professional practice and opinions among healthcare professionals. The study involved no patient data or direct patient contact, and its primary goal was to audit occupational health issues within the professional community. Therefore, it fell outside the scope requiring formal Research Ethics Committee review. All participation was voluntary, anonymous, and conducted in accordance with the British Society of Paediatric Gastroenterology, Hepatology, and Nutrition (BSPGHAN) and institutional QIP governance.

A 26-point *Google Forms* questionnaire survey (supplemental materials) was distributed via email and social media to all members of the British Society of Paediatric Gastroenterology, Hepatology, and Nutrition (BSPGHAN), between June to October 2024. The survey focused on three sections: firstly, clinical experience in endoscopy – including the seniority of the endoscopist, the number of years practising endoscopy, and the number of hours of endoscopy performed weekly (<1; 1-4; 5-10 hours). Questions were included on the setting in which endoscopy was performed, i.e. in a dedicated endoscopy suite, operating theatres, or in paediatric-specific or shared adult and paediatric settings. Respondents were presented with diagrammatic representations of different endoscopy suite set-ups and asked to select the one most closely representing their practice for both oesophagogastroduodenoscopy (OGD) and ileocolonoscopy (Figures 1 and 2).

Amongst these was a diagram representing best-practice as outlined in previous guidelines on ergonomics in endoscopy[10]. The second section of the survey focused on history of injury related to endoscopy, including the nature, frequency, and impact of any reported injuries, such as whether they required modification to the respondent’s workload, the use of analgesia, or time away from work. Furthermore, respondents were asked about their previous experience with ergonomic modification strategies in endoscopy and their history of cardiovascular or resistance exercise. The last section covered demographics. Survey questions were presented with Likert scales and multiple-choice options where appropriate. We performed statistical analysis using Fisher’s exact test to assess for differences in rates of ERI between groups.

RESULTS

Demographics [Table 1]

There were 65 complete survey responses out of a total 323 eligible BSPGHAN members contacted, providing a response rate of 20.1%. 50.8% (n=33) of respondents were female. 52.3% (n=34) were aged 35-44 years, 24.6% (n=16) aged 45-54 years). 53.8% (n=35) were consultant grade, the remainder were registrar (n=27), clinical fellow (n=1), or non-training Associate Specialist doctors (n=2). 76.9% (n=50) reported they performed 1-4 hours of endoscopy weekly, and 18.5% (n=12) practiced 5-10 hours weekly. 61.5% (40) respondents performed endoscopy in a paediatric-only operating theatre, with 16.9% (n=11) in paediatric dedicated endoscopy suite. The remaining 21.5% (n=14) performed endoscopy in shared adult/paediatric facilities.

Table 1: Demographics and Ergonomics Experience	
	Frequency % (n)
Total	100 (65)
Female	50.8 (33)
Age (years)	
35-44	52.3 (34)
45-54	24.6 (16)
Grade	
Consultant	53.8 (35)
Registrar, Fellow, Associate Specialist	46.2 (30)
Endoscopy hours performed (weekly):	
1-4	76.9 (50)

5-10	18.5 (12)
Experience of ergonomics	
	% (n)
Had training on ergonomics/ERI	13.9% (9)
Ergonomics included in theatre brief	6.2% (4)
Endoscopy room set-up	
Upper-GI endoscopy: optimum positioning	32.3% (21)
Upper-GI endoscopy: other positions	67.7% (44)
Lower-GI endoscopy: optimum positioning, left lateral	61.5% (40)
Lower-GI endoscopy: optimum positioning, supine	36.9% (24)
Lower-GI endoscopy: other positioning	6.2% (4)

Endoscopy-Related Injury [Table 2]

Over half of respondents (53.8%, n=35) reported they had previously experienced injury or pain related to endoscopy. Of those who had experienced injury or pain, the most reported experiences were hand/digit pain (62.2%, n=23); backache (35.1%, n=13); arm pain (24.3%, n=9); neck ache (16.2%, n=6). 29.2% (n=19) had experienced pain during endoscopy monthly, while only 18.5% (n=12) had taken analgesia for endoscopy related pain. While these figures indicate a high prevalence of injury among respondents, the 20.1% response rate and the targeted nature of the recruitment may contribute to an overestimation of these symptoms in the broader paediatric endoscopist population.

There were significant differences in rates of ERI in females vs males (69.7% vs 37.5%, p=0.013), as well as in respondents who reported performing

weight/resistance exercises vs not (39.4% vs 68.8%, p=0.025). There was no significant difference between rates of injury between consultants vs non-consultants (54.3% vs 53.3%), or respondents using water-assisted colonoscopy vs not (36.9% vs 60.1%, p=0.103). There were no significant differences in rates of ERI between age groups (aged <45 years vs >45 years, 56.1% vs 50%, p=0.79); and those performing cardiovascular exercise vs not (63.6% vs 51.9%, p=0.52).

There was no significant difference in rate of ERI between respondents adopting what was deemed to be optimum endoscopy suite set up as per ASGE guidelines (i.e. adjustment of room setup to maintain a neutral body posture and

minimise muscle strain)[1] for OGD (61.9% vs 50%, p=0.43) or colonoscopy (50.8% vs 75%, p=0.61). There was no significant difference in rate of ERI between those performing 1-4 vs 5-10 hours of endoscopy weekly (51.0 vs 58.3%, p=0.75).

Table 2: Rates of ERI		
	% (n)	p
Overall rate of ERI (n=65)	53.8 (35)	
Female vs male	69.7% vs 37.5%	0.013
History of weight/resistance exercises vs not	39.4% vs 68.8%	0.025
Consultant vs non-consultant	54.3% vs 53.3%	1.0
Water-assisted colonoscopy vs not	36.9% vs 60.1%	0.10
Age <45 vs >45	56.1% vs 50%	0.79
History of cardiovascular exercise vs not	63.6% vs 51.9%	0.52
Nature of ERI:	% (n)	
Neck ache	16.2% (6)	
Hand/digit pain	62.2% (23)	
Backache	35.1% (13)	
Arm pain	24.3% (9)	

History of analgesia for ERI	18.5% (12)

Experience of Ergonomics in Endoscopy [Table 1]

The vast majority of respondents at 86.2% (n=56) had never had any training focused on ergonomics and/or reducing ERI, and only 6.2% (n=4) reported that ergonomics formed part of their theatre brief. 9.2% (n=6) reported that they had previously encountered organisational or department-level financial constraints preventing the introduction of ergonomic adjustments to endoscopy such as a second screen or anti-fatigue mats.

The most common ergonomic adjustments respondents reported currently being performed were bed height adjustment (86.2%, n=56), screen height adjustment (76.9%, n=50), wearing soft-soled shoes (46.2%, n=30), micro-breaks between cases (15.4%, n=10), and performing stretches between cases (15.4%, n=10). There were significant differences between the rates of awareness of certain ergonomic modifications, compared to how frequently such modifications were put into practice. For example, 30.8% (n=20) of respondents were aware of the importance of wearing soft-soled shoes for endoscopy, whereas only15.4% (n=10) of respondents reported wearing soft-soled shoes in practice ($p<0.0001$).Similarly, 21.5% (n=14) reported awareness of the importance of undertaking micro-breaks between cases, whereas only 15.4% (n=10) reported practising this modification ($p<0.0001$). 4.6% (n=3) respondents were not aware of any ergonomic modifications in endoscopy.

DISCUSSION

This study provides the first national insight into attitudes toward ergonomics and the prevalence of ERI among paediatric endoscopists in the UK. Our findings demonstrate ERI prevalence amongst respondents of 53.8%, which in the context of the 20.1% response rates, reflects that at least 10.8% of UK paediatric gastroenterologists are affected by ERI. These data suggest that ERI may be an underreported occupational health issue within this cohort, with over half of respondents reporting pain or injury linked to their endoscopic practice. This prevalence mirrors reports from adult gastroenterology colleagues and US paediatric endoscopists, emphasising that ERI is a widespread and under-recognised problem across paediatric endoscopy[2,4–8,10].

Consistent with previous literature, the hand and digits were the most commonly affected areas, reinforcing the physically demanding nature of endoscopic procedures that involve repetitive manual tasks. The frequent reporting of back, arm, and neck pain further illustrates the multifactorial ergonomic challenges posed by prolonged standing, non-neutral body postures, and equipment manipulation inherent to these procedures.

One of the most striking findings was the significantly higher incidence of ERI among female endoscopists compared to males (69.7% vs 37.5%, $p=0.013$). This aligns with existing data from adult endoscopy populations and raises important considerations regarding gender-specific ergonomic risk factors, such as hand size, grip strength, or susceptibility to musculoskeletal strain. Addressing these differences through tailored ergonomic adjustments, training, and equipment design may help mitigate this disparity.

Notably, respondents who engaged in resistance or weight training exercises reported significantly lower rates of ERI, suggesting that targeted physical conditioning could serve as a protective factor. In contrast, cardiovascular exercise alone did not confer a similar benefit, highlighting the importance of strength and musculoskeletal resilience in injury prevention. These findings can inform workplace wellness initiatives and individual preventive strategies to reduce injury risk.

Despite the high burden of ERI, formal ergonomics training remains largely absent, with 86% of respondents reporting never having received training in ergonomics and only 6.2% having ergonomics integrated into theatre briefings. While basic adjustments such as bed and screen height modifications are widely adopted, more proactive measures, such as scheduled micro-breaks and active stretching between cases, are not routinely practiced, reflecting a missed opportunity for injury prevention.

Interestingly, adherence to optimal endoscopy suite set-up as per guideline-based recommendations did not significantly correlate with reduced injury rates. This may reflect limitations related to self-reporting, individual variability in anthropometry, or the multifactorial nature of ERI, which extends beyond room layout to include workload factors and individual technique. Additionally, some respondents reported financial constraints hindering the implementation of ergonomic improvements, pointing to systemic barriers that should be addressed.

Collectively, these findings highlight an urgent need to integrate ergonomics into paediatric endoscopy training, workplace policies, and clinical guidelines in the UK. Such initiatives should focus on raising awareness, promoting best practice ergonomic techniques, encouraging regular physical conditioning, and facilitating

access to ergonomic equipment and workplace modifications. BSPGHAN and allied professional bodies are well placed to champion the development and dissemination of such resources to safeguard the health and productivity of paediatric endoscopists. We suggest that there is a role for advanced studies in endoscopy ergonomics to incorporate robotic system analysis and kinesiological assessment of endoscopists' biomechanics, to establish a definitive framework for optimum clinical technique.

Despite the reported high prevalence of ERI amongst respondents, these findings should be interpreted in the context of the limitations of our study. The modest 20.1% response rate, introduces the risk of selection bias, potentially under- or overestimating the true prevalence of ERI. The cross-sectional design and reliance on self-reported data limit causal interpretations and pose the risk of recall bias. A further limitation of the study design is that survey questions focused on hours of endoscopy performed rather than the number and type of procedures performed. Indeed, these differences may contribute to varying ERI outcomes and have not been explored in this work. Future studies should incorporate objective ergonomic assessments and longitudinal monitoring to better characterise risk factors and evaluate the impact of preventive interventions.

CONCLUSION

This is the first UK nationwide study of ergonomics and ERI amongst paediatric endoscopists. Over half of paediatric endoscopists surveyed experienced ERI, most commonly hand/digit pain, backache, arm pain, and neckache. The vast majority of endoscopists had never had training in ergonomics. We found that women and endoscopists not performing resistance exercises were significantly more likely to experience ERI, and that the vast majority of respondents had never undergone formal training in endoscopy ergonomics. These findings provide impetus for the development and delivery of training and guidelines in ergonomics to reduce the risk of occupational injury amongst UK-based paediatric endoscopists.

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Table Legends:

Table 1: ERI - Endoscopy-related Injury; GI - gastrointestinal

Table 2: ERI - Endoscopy-related Injury

Figure Legends:

Figure 1: OGD - oesophagogastroduodenoscopy