ACG'S IBD SCHOOL
JANUARY 30, 2021 | Virtual!

Register online: meetings.gi.org

ACG / FGS ANNUAL SPRING SYMPOSIUM
FEBRUARY 27, 2021 | Virtual!

Register online: meetings.gi.org
Participating in the Webinar

All attendees will be muted and will remain in Listen Only Mode.

Type your questions here so that the moderator can see them. Not all questions will be answered but we will get to as many as possible.
How to Receive CME and MOC Points

LIVE VIRTUAL GRAND ROUNDS WEBINAR
ACG will send a link to a CME & MOC evaluation to all attendees on the live webinar.

ABIM Board Certified physicians need to complete their MOC activities by December 31, 2021 in order for the MOC points to count toward any MOC requirements that are due by the end of the year. No MOC credit may be awarded after March 1, 2022 for this activity.

MOC QUESTION
If you plan to claim MOC Points for this activity, you will be asked to: Please list specific changes you will make in your practice as a result of the information you received from this activity.

Include specific strategies or changes that you plan to implement. THESE ANSWERS WILL BE REVIEWED.
ACG Virtual Grand Rounds
Join us for upcoming Virtual Grand Rounds!

Week 4, 2021
Functional Dyspepsia: How to Deal with the Burn and the Bloat
Scott L. Gabbard, MD
January 28, 2021 at Noon Eastern

Week 5, 2021
Cross-Sectional Imaging in IBD and Small Bowel Bleeding: What Every Gastroenterologist Should Know
Jonathan A. Leighton, MD, FACG
February 4, 2021 at Noon Eastern

Visit gi.org/ACGVGR to Register

Disclosures:

Speaker:
Patrick E. Young, MD, FACG
Dr. Young has no conflicts of interest related to this talk.

Moderator:
Sunanda V. Kane, MD, MSPH, FACG
Dr. Kane has no conflicts of interest related to this talk.
The Ergonomics of Endoscopy:

Patrick E. Young, MD, FACG
Professor of Medicine, Director, Division of Digestive Diseases
Uniformed Services University

@peyoungmd
peyoungmd@gmail.com

Disclosures

- I have no financial disclosures.
- The views of the presenter are his own and do not necessarily represent those of The Uniformed Services University, Walter Reed National Military Medical Center, or the Department of Defense.
Definition and Background

- Greek origins
  - Ergo – Work
  - Nomos – Law
- Workplace design
- Optimize interface of operator and environment
- Endoscopy involves:
  - Repetitive motions
  - Awkward positions

- Higher endoscopic volumes
Are Endoscopy Related Injuries Common?

AKA “Why should we care?”

How Common Are Injuries?

- 30-80% of endoscopists report some work-related injury
- 1 in 5 had to take time off
- Over 50% modified practice; 65% sought treatment
- CAVEAT: Almost all data come from surveys

Types of Injuries

- Neck (9-46%)
- Hand/Thumb (14-82%)
- Back (15-57%)

**Gastroenterologist Shortage Is Forecast**

**RESEARCH**

By RONI CARYN RABIN  JAN. 9, 2009

A shortage of 1,630 US gastroenterologists is expected by 2025 though a surplus is expected in the Northeast.

Why do work-related musculoskeletal injuries occur?

Pilot Study

- 3 colonoscopists, 3 colonoscopies
- Surface EMG on right and left forearm
- Pressure sensor on right thumb
- Compared forces with ACGIH* standards

Shergill AK. GIE 2009.

*American Conference of Government Industrial Hygienists
## Anatomy Review

### Table 1. Muscle groups examined and potential injuries

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Action</th>
<th>Subtask during colonoscopy</th>
<th>Potential injury</th>
<th>Study results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left APL</td>
<td>Abduction and extension of thumb</td>
<td>Manipulating dials of colonoscope</td>
<td>DeQuervain’s tenosynovitis</td>
<td>Yes</td>
</tr>
<tr>
<td>Left ECR</td>
<td>Wrist extension and abduction</td>
<td>Stabilizing control section of colonoscope</td>
<td>Second and third extensor compartment tenosynovitis at the wrist and epicondylitis (tennis elbow)</td>
<td>Yes No</td>
</tr>
<tr>
<td>Left FDS</td>
<td>Flexion of the digits of the hand</td>
<td>Grasping control section of colonoscope</td>
<td>Carpal tunnel syndrome</td>
<td>No No</td>
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</tr>
</tbody>
</table>

Shergill AK. Gastrointest Endosc 2009;69(1):142-146.
Risk Factors (General)

- Fixed or constrained body positions
- Continual or repetitive motions
- Force concentrated on small parts of the body
- A pace of work which does not allow sufficient recovery

Canadian Center for Occupational Health and Safety. OSHA fact sheet on work-related musculoskeletal disorders. 2018

Risk Factors

- Higher procedure volume
- Years practicing endoscopy
- ERCP/use of lead aprons
- ?Gender
GI Fellows

- 50% had a musculoskeletal injury
- 85% were endoscopy related
- ~25% had ergonomics training
- 83% desired such training


Fig. 1 Site of endoscopy-related musculoskeletal injury.
Grip Style and Injury

- Power Grip
  - Increased strength
  - Decreased injury

- Pinch Grip
  - Increased precision
  - Increased ROM
  - Increased injury potential
Surgical Data

- Does hand size matter?
  - Bigger hands, fewer injuries
  - Not just hand injuries

- Does gender matter?
  - Injuries in women > men
  - Even when matched for hand size


Glove Size and Fatigue

Figure 2: Comparison of average fatigue level between different glove size groups after open and laparoscopic surgery.

Endoscopy Data

- 183 procedures (81 upper, 102 lower)
- Maximum voluntary contraction (MVC)
  - Medial deltoid, trapezius, anterior and posterior forearms
- Subgroup analysis
  - Glove Size (GS)
  - Experience (> or < 300 endoscopies)
- Significant ↑ left forearm MVC for smallest (≤ 6) GS
- Greater trapezius strain with less experience
- No difference in surgeons vs. gastroenterologists

Shiang A. Gastrointest Endosc 2020. 91(6s):AB15
826 person survey (7.8%), 290 item survey

Overall injury rates: men = women

Wrist, elbow, shoulder, upper back, right thumb: women > men

4.5% reported ergonomics training

Gastroenterology 2017;152: S217

Ergonomics and Pregnancy

Changes in Pregnancy
- Ligamentous laxity
- Fluid retention
- Weight gain
- Shift in center of gravity

Modifications
- Rest abdomen on bed
- Limit standing time to 2 hours
- Consider brace for CTS
  - Light lead
  - Seated endoscopy

Common Issues
- Low back pain
- Carpal tunnel syndrome
- Pelvic girdle pain
- DeQuervain's tenosynovitis

Adjuncts
- Avoid rapid day/night rotation
- Strengthen hip extensors/gluteal
  - Massage
  - Foot stools
  - Supportive footwear

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Possible Solutions

- Environmental
- Operator/Team
- Disruptive technologies


Room Set Up

Patient Bed

Tower
Impact

- British study of ~ 300 ERCP
- Two monitors moved closer together
- Primary outcome: fluoroscopy time
- -1.4 minutes (p=0.026)

Virtual Grand Rounds

Cushioned Floor Mats

Operator Ergonomics

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Think of Yourself as an Endo-athlete

Body Position

- Comfortable stance
- Standing on both feet
- Equal weight distribution
- Natural curves in back and neck
Give Yourself a Break?!

- 56 surgeons given guided exercises mid surgery
- > 57% had improved physical performance
- > 34% had improved focus
- No change in mean surgery duration
- Unclear how this relates to endoscopy

Team

- Educate
- Give permission to critique
- Ergonomic time out


Stretches

- ACG Universe
- You tube - https://www.youtube.com/watch?v=vJ2bGWyKdWw&t=25s
Knob Extenders

A Word on Disability Insurance

- Start young
- “Own occupation specific”
- Provision for future benefit increases
Disruptive Technologies
AKA changing the way we “scope”
Adaptations in Endoscope Design

Robots and Magnets
Magnetic-assisted capsule endoscopy in the upper GI tract by using a novel navigation system (with video)

Imdadur Rahman, MD,1 Mathieu Fioche, MD,1 Chun Sup Shim, MD,1 Sung Pyo Lee, MD,1 In-Ryung Sung, MD,1 Jean-Christophe Saurin, PhD,1 Pradipt Patel, MD2
Southampton, United Kingdom; Lyon, France; Seoul, South Korea

Maneuverability and safety of a magnetic-controlled capsule endoscopy system to examine the human colon under real-time monitoring by colonoscopy: a pilot study (with video)

Hongxiong Gu, MD,1 Huiling Zheng, MM,2 Xiaobing Cui, MD, Ying Huang, BN, Bo Jiang, MD
Guangzhou, China

Closed Loop Control of a Tethered Magnetic Capsule Endoscope
Addisu Z. Taddese*, Piotr R. Slawinski†, Keith L. Obstein‡, and Pietro Valdastri*
*Mechanical Engineering Department, Vanderbilt University, Nashville, TN, USA
†Division of Gastroenterology, Hepatology, and Nutrition, Vanderbilt University Medical Center, Nashville, TN, USA

Will the steerable capsule replace upper endoscopy in the future?
Referring to Ching HL et al. p. 409–418
Research Questions

- What is the impact of pro-ergonomic interventions on injury? Disability?

- How cost effective are ergonomic interventions?

- What is the optimal work/rest cycle to optimize productivity while reducing injury?

- Are there exercises, etc. one can do to enhance resistance to injury?
Take Home Points

• Advocate for better scopes !!

• Meanwhile...
  • Optimize room design
  • Optimize positioning and body mechanics
  • Treat yourself as an endo-athlete
  • Prepare and empower your team

• America needs you
All we know is still infinitely less than all that remains unknown.
CONNECT AND COLLABORATE IN GI

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ACG GI Circle
ACG Hepatology Circle
ACG Functional GI Health and Nutrition Circle
ACG Women in GI Circle

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