WEO

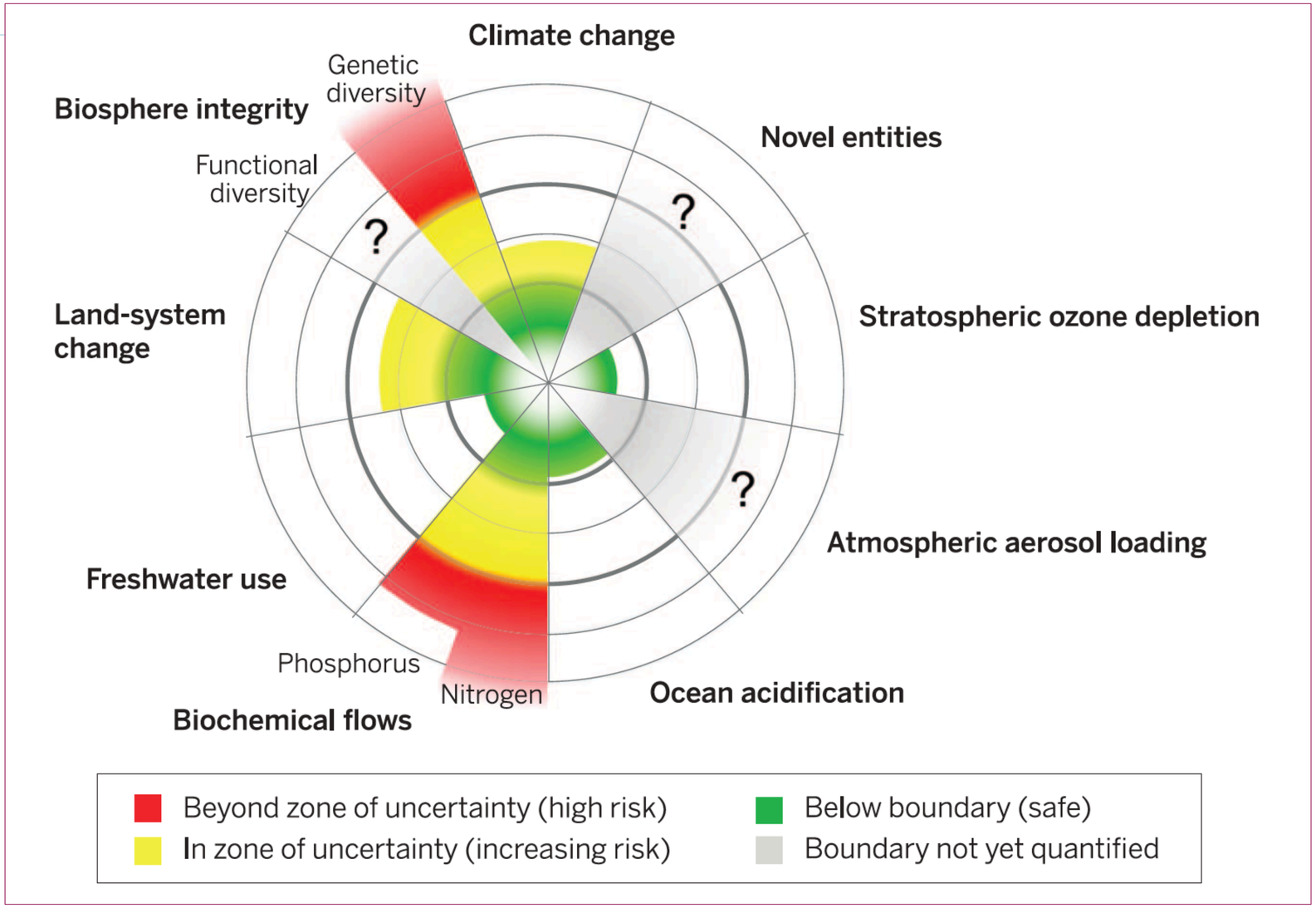
The voice of world endoscopy

Small steps, big impact, how AI assisted colonoscopy can help reducing carbon footprint

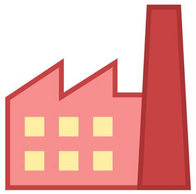
Heiko Pohl, MD

Why are we talking about this?

Planetary Boundaries



Steffen et al Science 2015

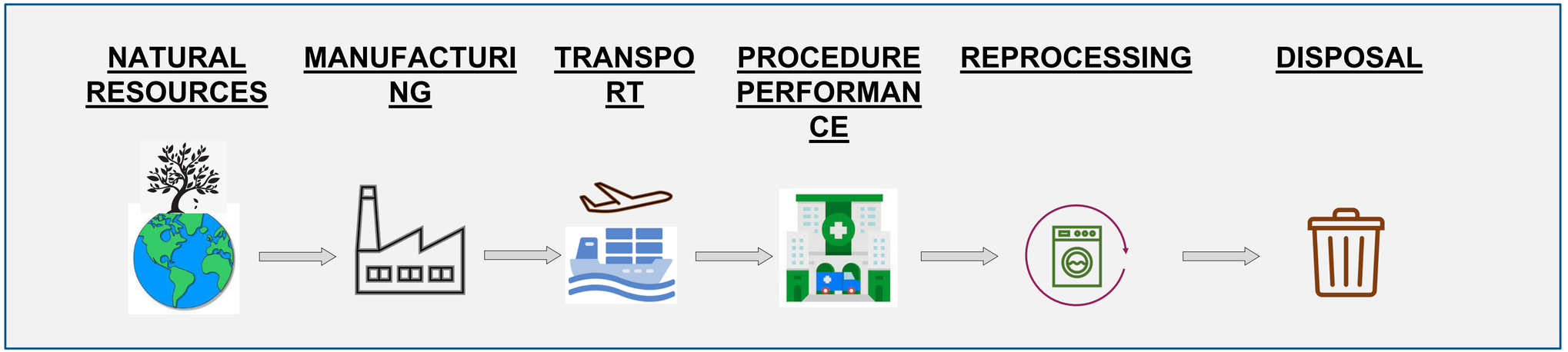


Industrial age → GHG → **Climate Change (Environment)**

- 8.5% of GHG in the US
- 4.4% worldwide

Healthcare system ← **Health (GI)**

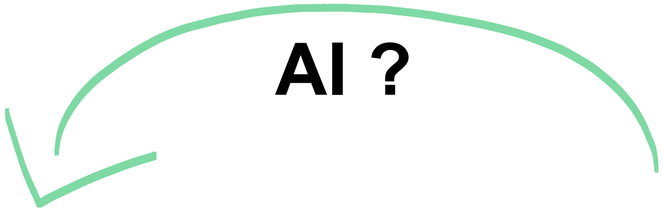
Carbon Footprint (CO_2e)



Scope 1: Direct emissions (burning fuel, anesthetic cases)

Scope 2: Indirect emissions (electricity from fossil fuels)

Scope 3: Supply chain (70-80%)

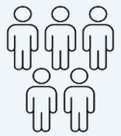


AI → **Colonoscopy** → **⇩ CO_2 / <u>Sustainability</u>**

- CADe
- CADx
- Cecal intubation
- WT
- ESD support
- Bleeding prediction
- Quality reporting
- Procedure documentation

What needs to be accomplished to achieve sustainability?

Value of CRC screening



Society

CRC Prevention

⇩ CRC mortality

$$\textbf{Value} = \frac{\textbf{QUALITY}}{\textbf{Cost (\$100 000)}}$$

Population Health

Value of CRC screening

Society

CRC Prevention

⇩ CRC mortality

$$\text{Value} = \frac{\text{QUALITY}}{\text{Cost (\$100 000)}}$$

Population Health

Global

CRC Prevention for all

⇩ Global CRC mortality

$$\text{Value} = \frac{\text{QUALITY}}{\text{Cost}}$$

- Financial
- Environmental
- Social

Global, planetary Health

Principles of Sustainability

Pt empowerment, self care

Support patients to take a bigger role in managing their own health and healthcare

Prevention

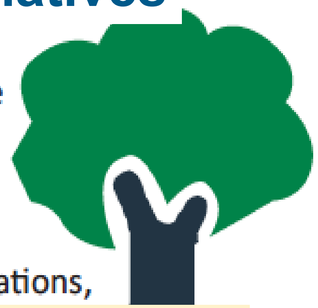
> Promoting health
> Preventing disease
> Reduce the need for healthcare

Lean services

> Services where people need them
> Streamlining care to minimise low value activity

Value (⇩ procedures)

Low carbon alternatives



> Preferential use of effective treatment and medical technologies with lower environmental impact
> Minimising waste of medications,

⇩ Equipment

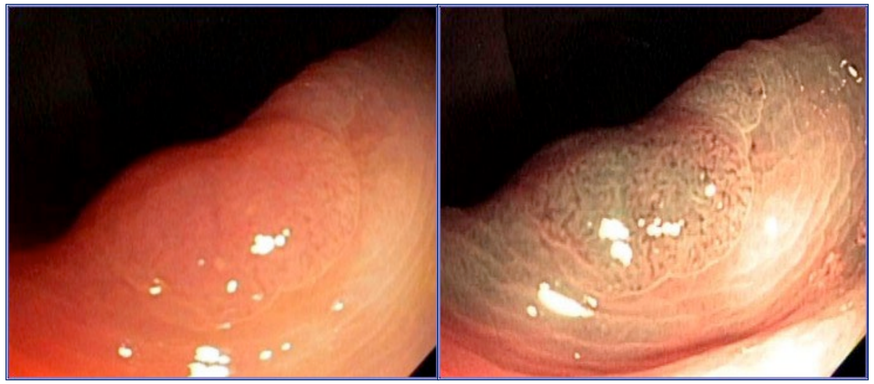
Preprocedure

- Appropriate indication? → Streamline with AI
- Bowel prep → Individualize with AI
- Sedation → Individualize with AI

Procedure

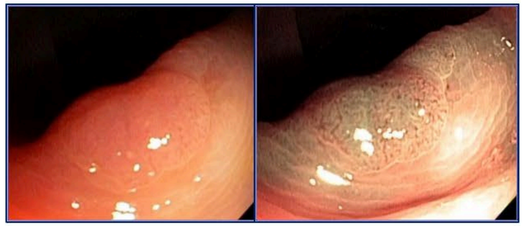
R & D

- AI assisted = Endoscopist alone
- “Back up”
- Quality assurance
- Photo documentation



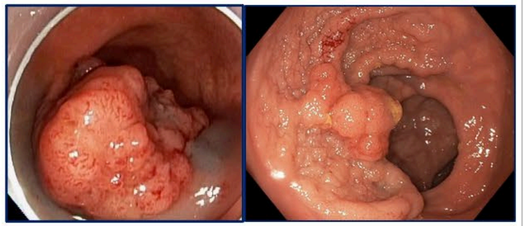
Procedure

Polyp resection



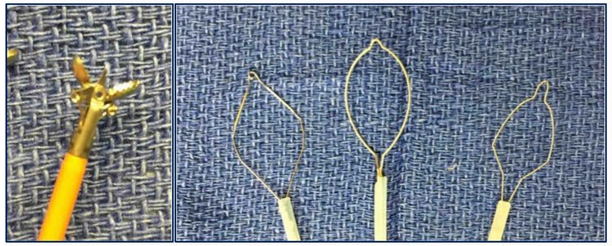
Dim/small/large

Large/very large



Basic Resection

- Forceps
- Cold snare
- Hot snare



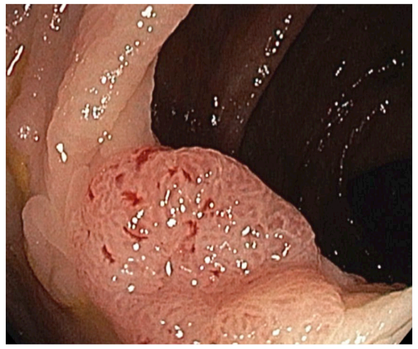
Complex Resection

- EMR hot vs cold
- Underwater EMR
- ESD
- Full thickness

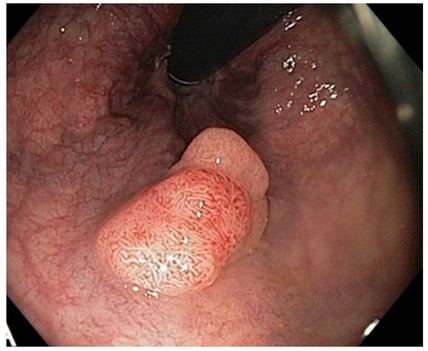
AI → individualize approach

When to use submucosal injection?

10 mm TC

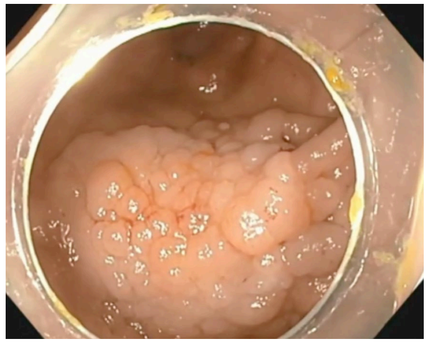


12 mm AC



15 mm rectum

20 mm cecum

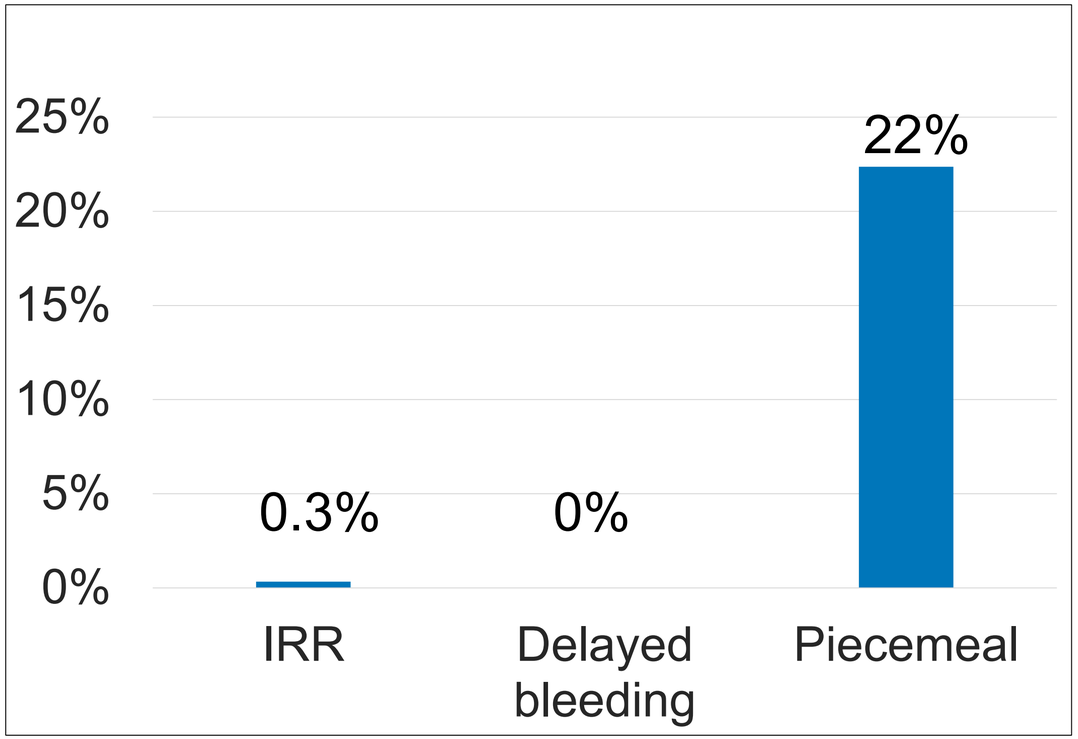


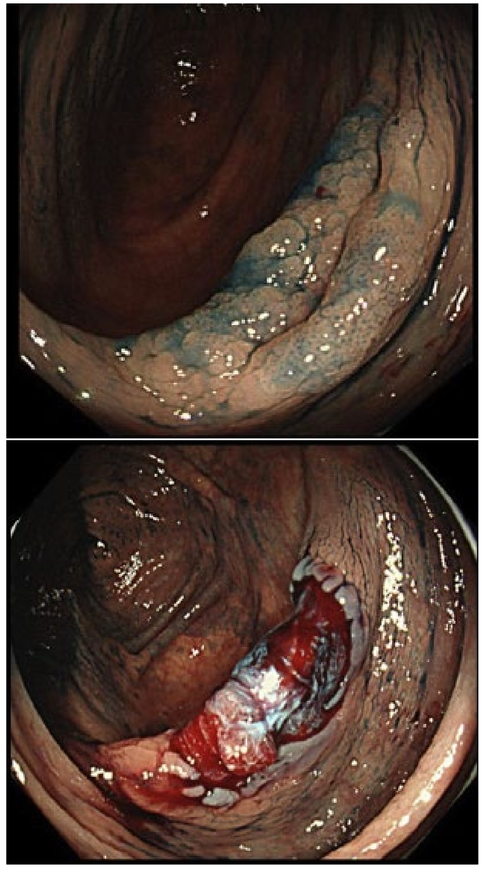
30 mm AC

Size Threshold?

Submucosal Injection?

474 SSL ≥10 mm
Cold snare resection without sm injection





→ **SSL of <u>any size</u>: Cold snare without submucosal injection**

Kimoto et al. 2022

Recognizing Cancer Risk – When to use ESD?

1-2%

LST-G, IIa

5-7%

LST-G, Is-IIa

10-15%

LST-NG, IIa

40-50%

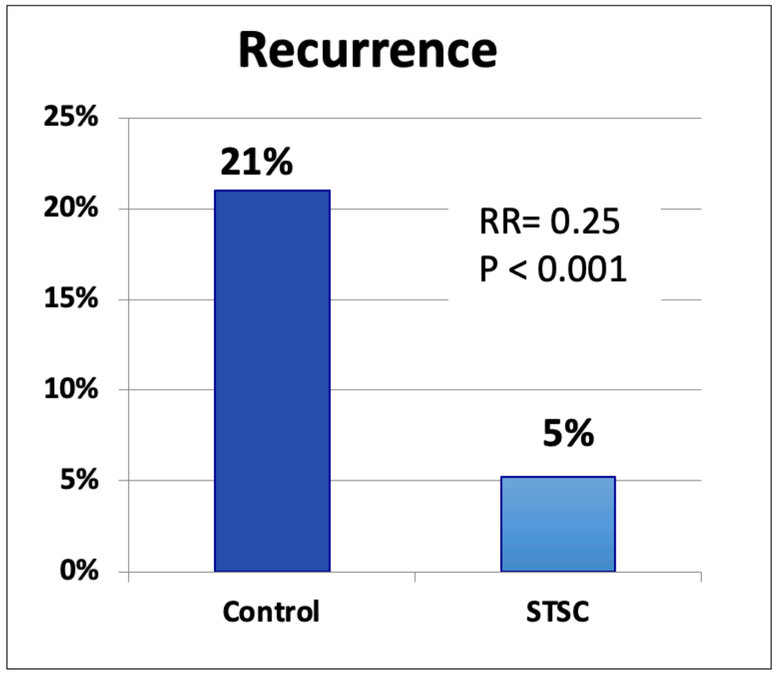
LST-NG, Is

	Lower Risk		Greater Risk
LST	G (Granular)	→	NG (Non-Granular)
Paris	IIa (flat)	→	Is (sessile)
Location	Proximal	→	Distal/Rectum
Size	Small	→	Large

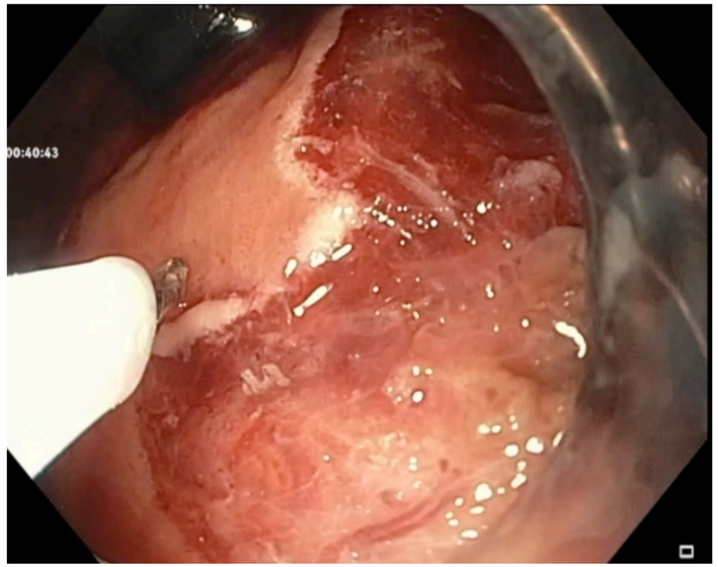
Moss A, Gastro 2011
Burgess et al, Gastro 2017

Ablation of Resection Margin and Recurrence

- RCT, n=416 lesions (390 patients)
- Ablation vs. No Ablation of resection margin (Snare tip soft coagulation = STSC)



- Limited to piecemeal resection

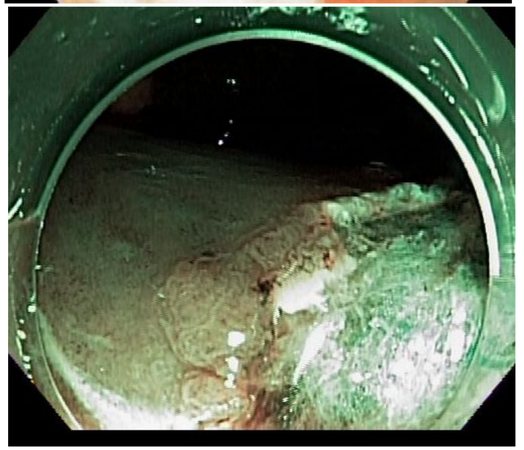


STSC vs. **hAPC** vs. **APC** vs. **Margin ablation?**

Klein Gastro 2018

Incomplete resection

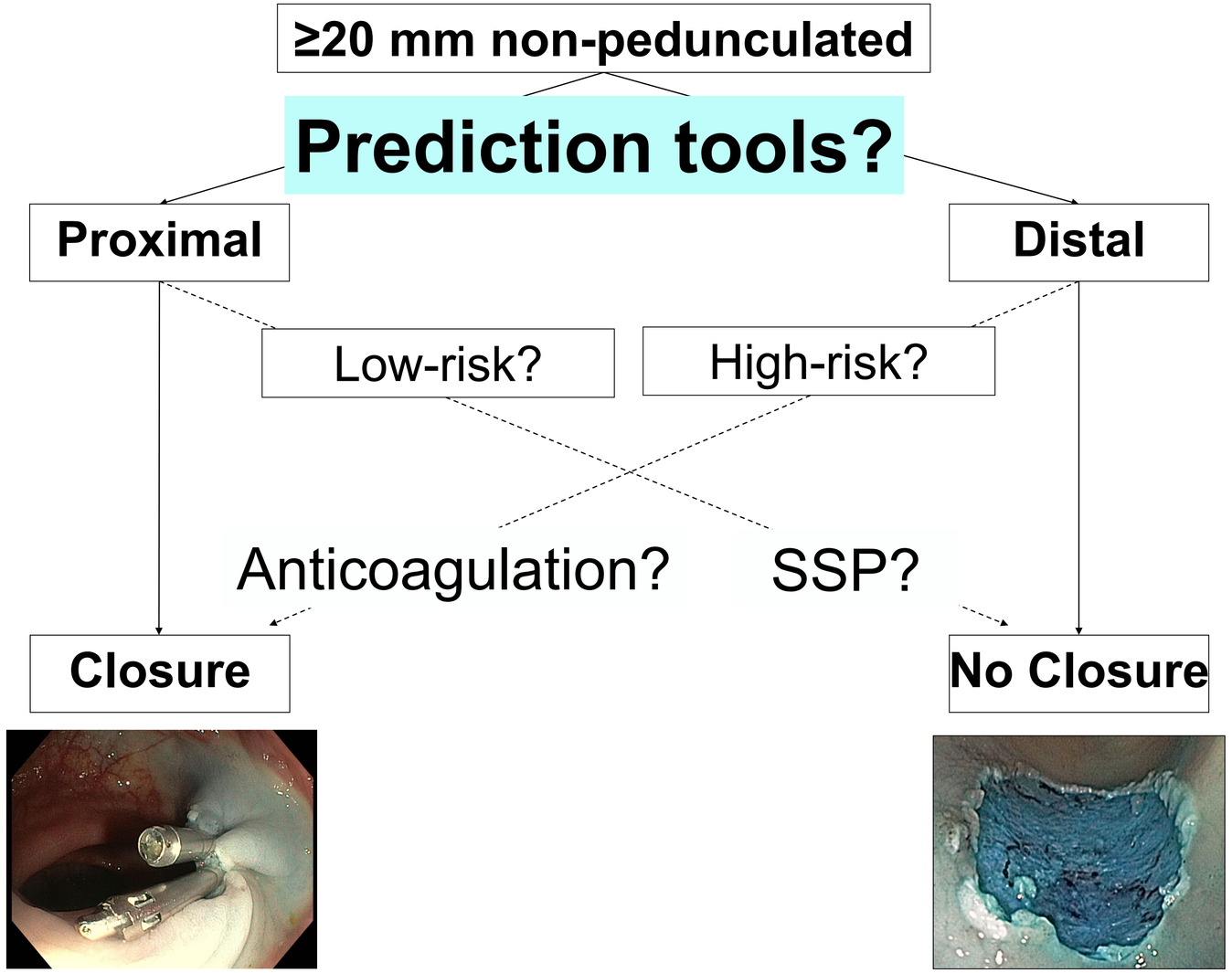
- CARE 2013 10% (5-10mm)
- Djenbachian 2020 (SR) 10% (1-10 mm)
- Pedersen 2022 16% (hot/cold) (≥5 mm)



<u>Possible Role of AI</u>

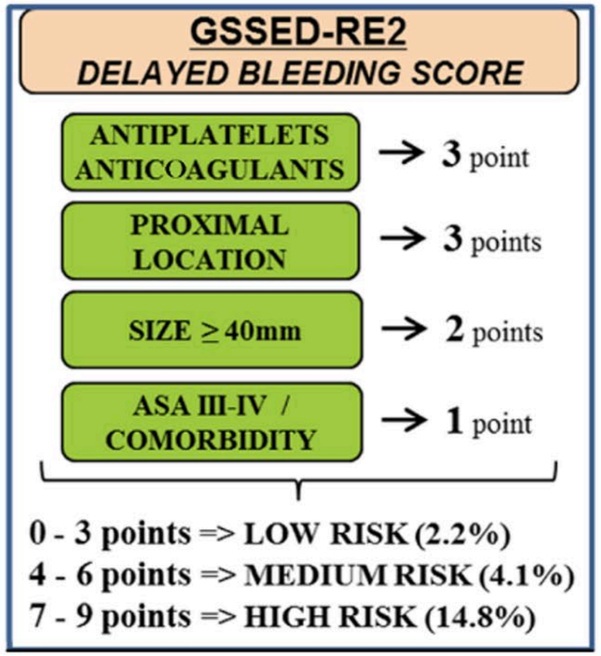
→ Assess resection base/margin with AI
→ Assess quality of resection for endoscopist

To close or not to close?

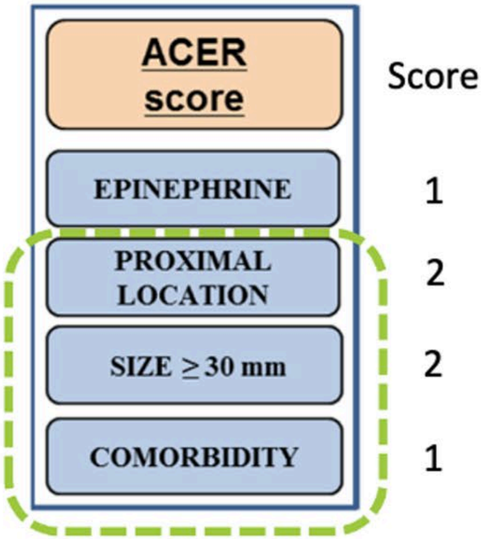


Who benefits from closure? Prediction tools

Albeniz 2019, GIE



Bahin/Bourke 2016:

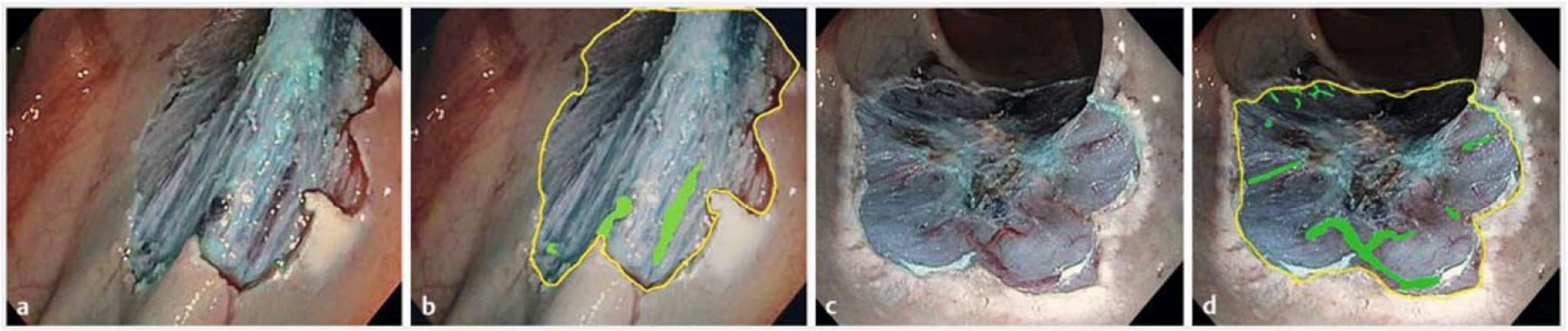


AUC 0.71 **AUC 0.69**

Validation in CLIP study cohort (Ayesha, ESGE 2021)

AUC 0.53 **AUC 0.57**

AI to select lesions for defect closure?



86 patients (43 with bleeding)

Morphometric variables of blood vessels

NNET
Sensitivity 100%
Specificity 77%

Shaleve, Bourke, Endoscopy 2020

Postprocedure – role of AI

- Surveillance interval (individualized?)

Summary

1. AI as possible solution based on problem / goal

2. Sustainability principles → increase value by decreasing un-needed procedures and decreasing equipment

3. Pre/intra/postprocedure components

4. Examples:
   a) R & D
   b) Individualized resection and bleeding prevention
   c) Understanding incomplete resection