

PET 2017



WEO Program for Endoscopic Teachers, Brasilia 2017

Endoscopic Simulators –tools and tips

Fabian Emura MD, PhD, FASGE
Professor of Medicine
Universidad de La Sabana
Bogota DC, Colombia

Possible conflicts of interest*

None related to this talk

Objectives

- Describe the available simulators
- Describe the utilization, discuss capabilities and limitations
- Explain how simulators may be incorporated into endoscopic training

Endoscopic simulators

- Animal models
- Mechanical simulators
- Bio-simulators (ex-vivo models)
- Computerized simulators

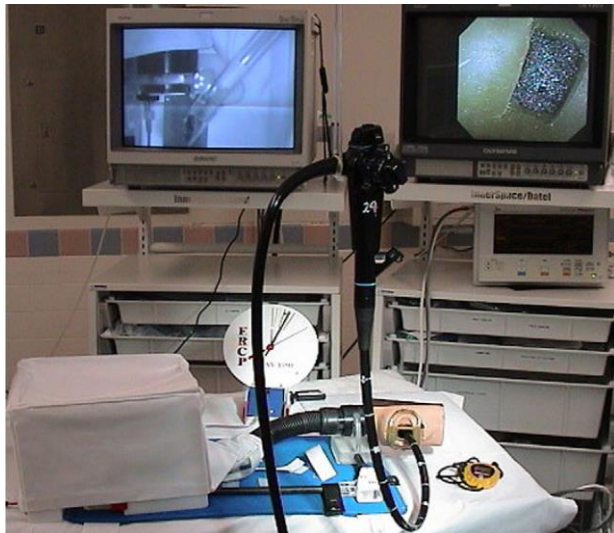
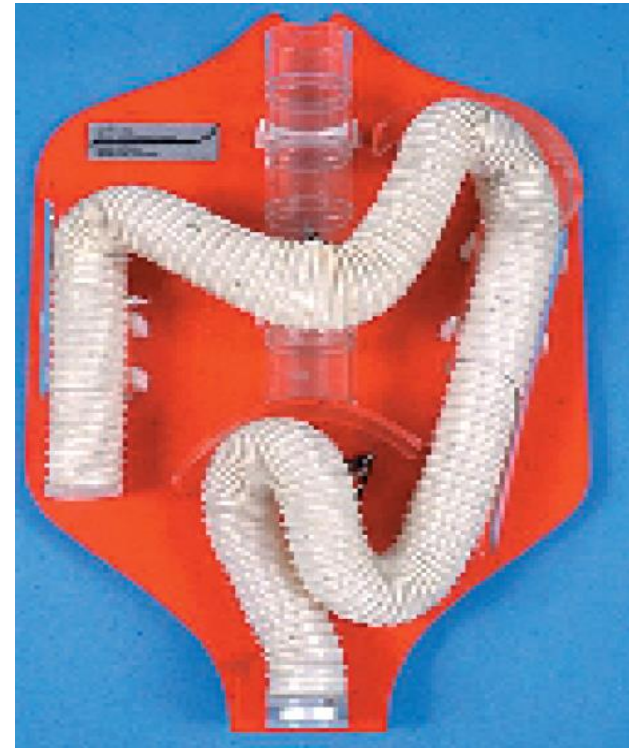
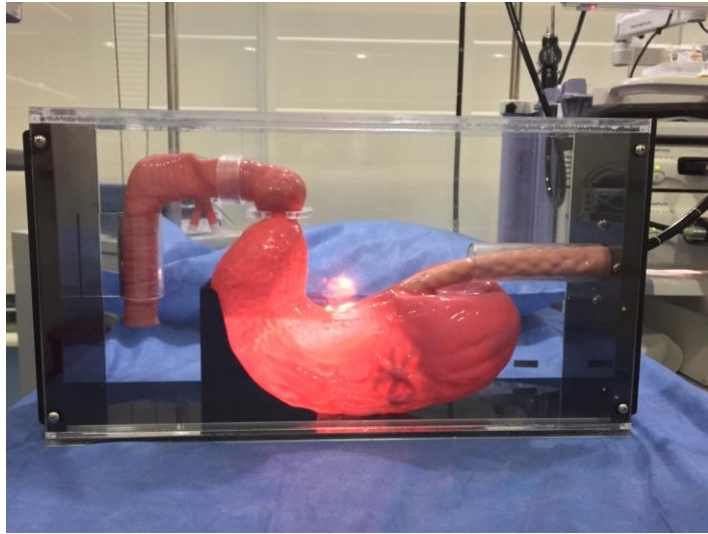
Animal models

Limited usage 2017

- Survival trials of new techniques
- Advanced techniques where bleeding and motility are needed prior to human experience



Mechanical simulators



ERCP Trainer - Instruction for use

The cook devices used in the following video
are for illustration purposes only.

Please refer to IFU and instructional videos for correct
usage of device.

Some products or part numbers may not be
available in all markets.

The box simulator

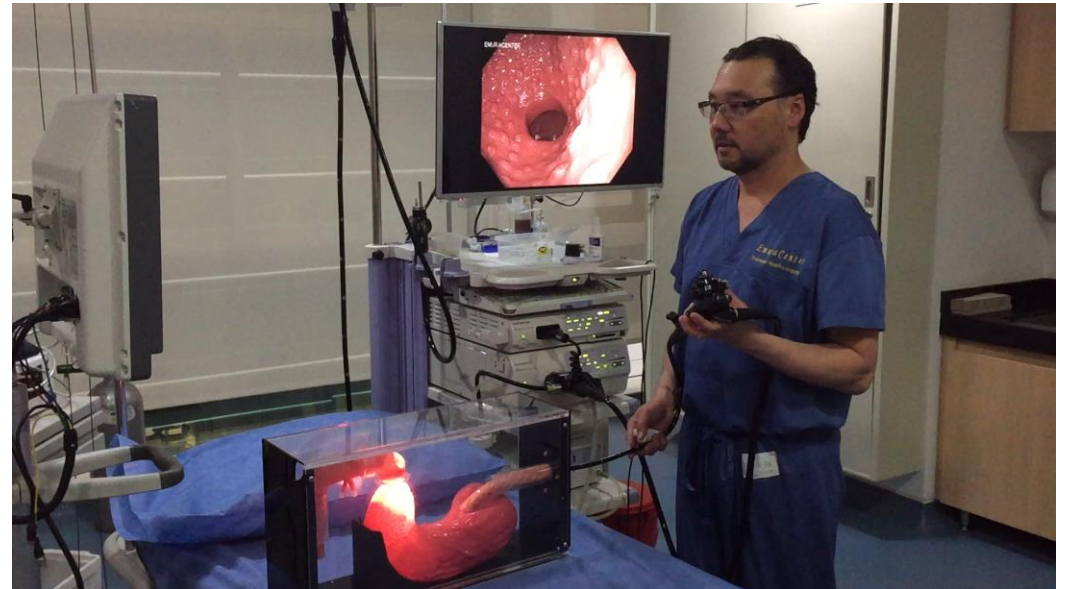
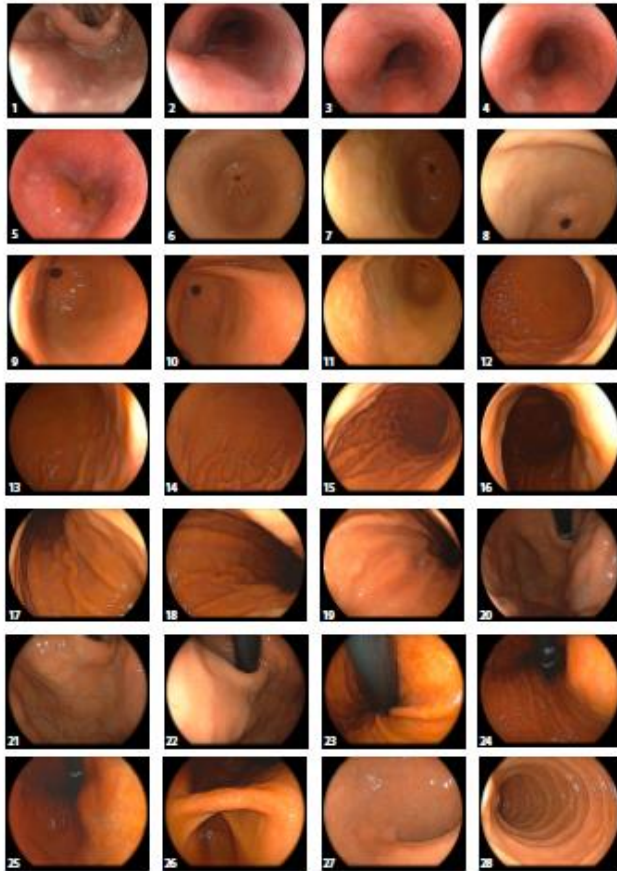
- Low cost model designed with MIT engineers based on deconstructing key tasks
- Intended to teach and assess colonoscopy specific skills



Mechanical simulation

Basic skills, precision

Systematic Alphanumeric Coded Endoscopy (SACE)

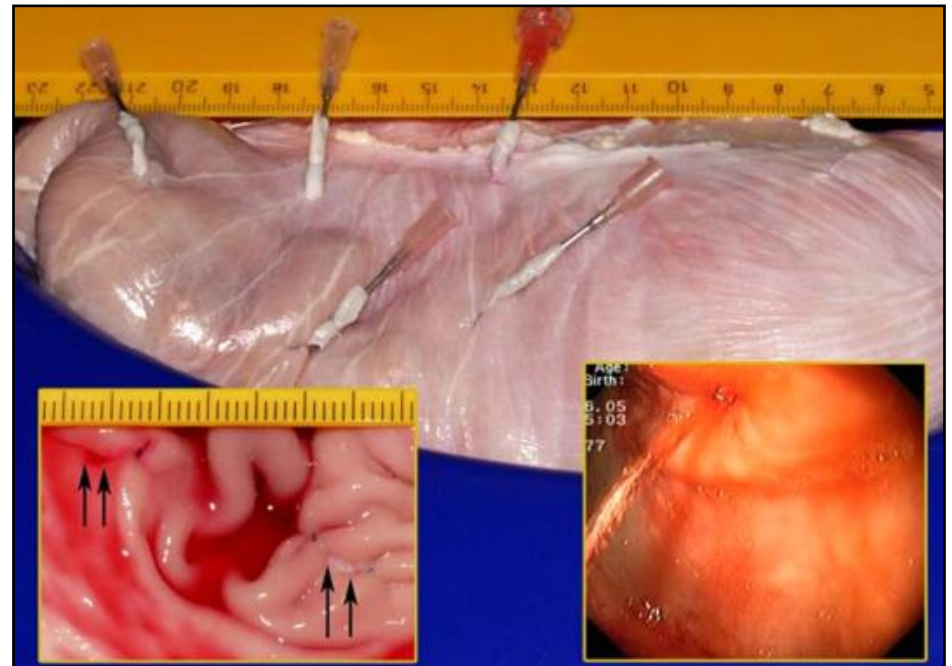
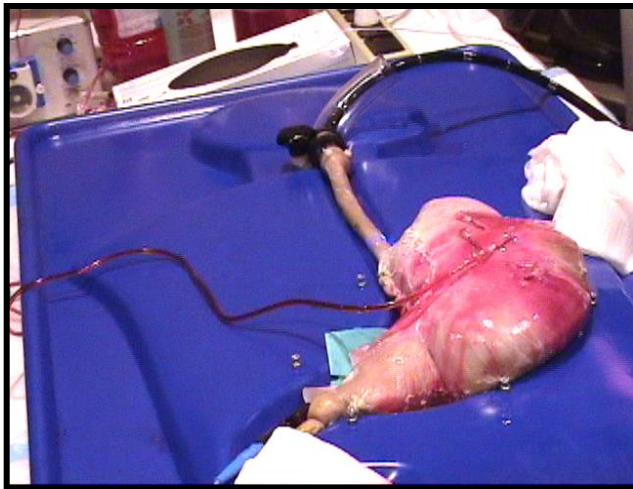


Bio-simulators (ex-vivo models)

A turning point in simulator training

Toronto Live course Oct 1995:

Juergen Hochberger introduces EASIE model to senior faculty panel with realism of bleeding Deulafoy simulation



Active bleeding simulation -video

Hemostasis with Clips

ESD training. Ex-vivo simulation

National Cancer Center Hospital, Japan



2002



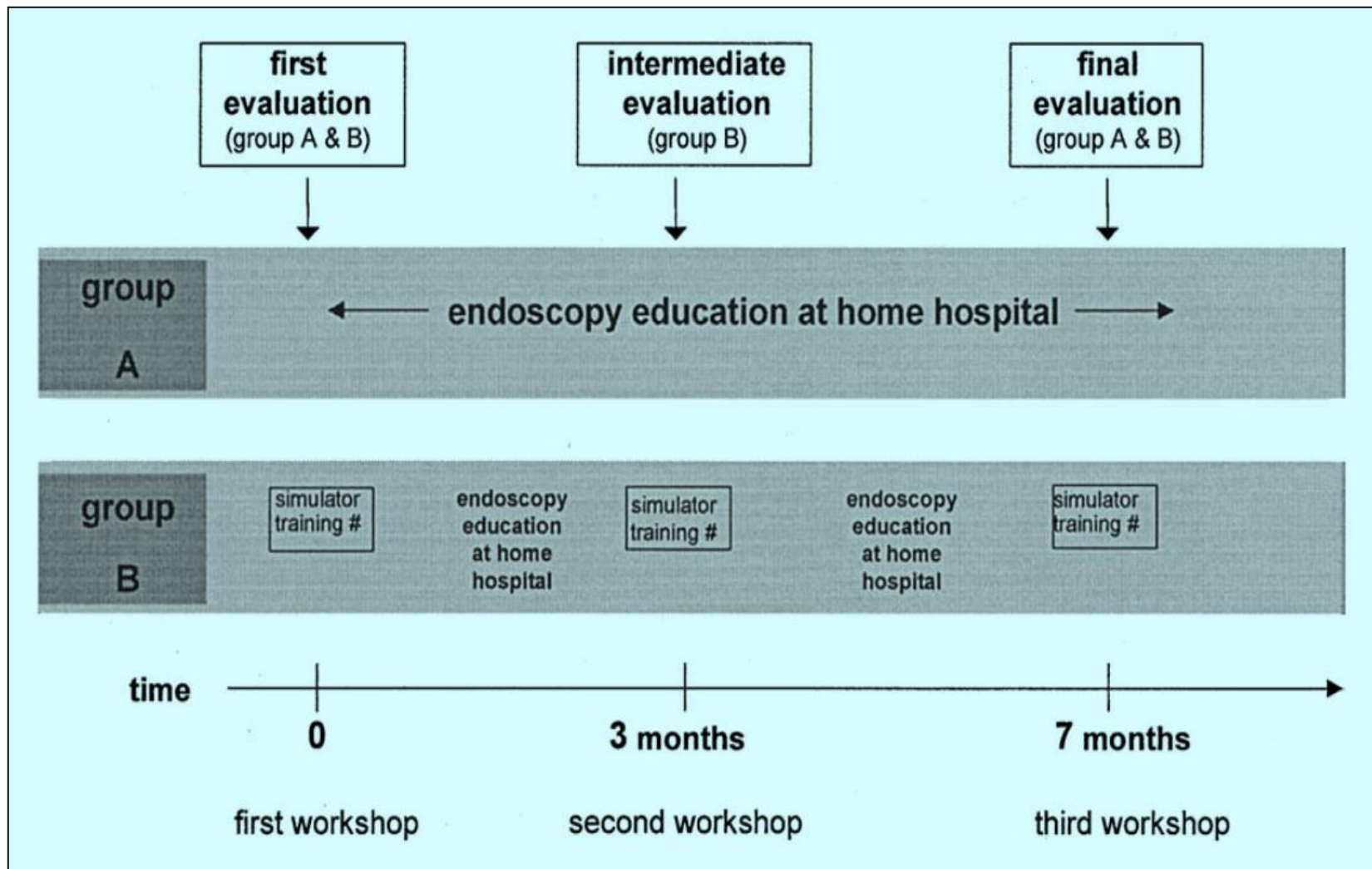
2005

Why ex-vivo training works

- Many aspects are very realistic
- Repetition possible
- Ethical benefit as zero risk to patients
- Education facilitated by low stress conditions
- Allows focus on specific procedure components

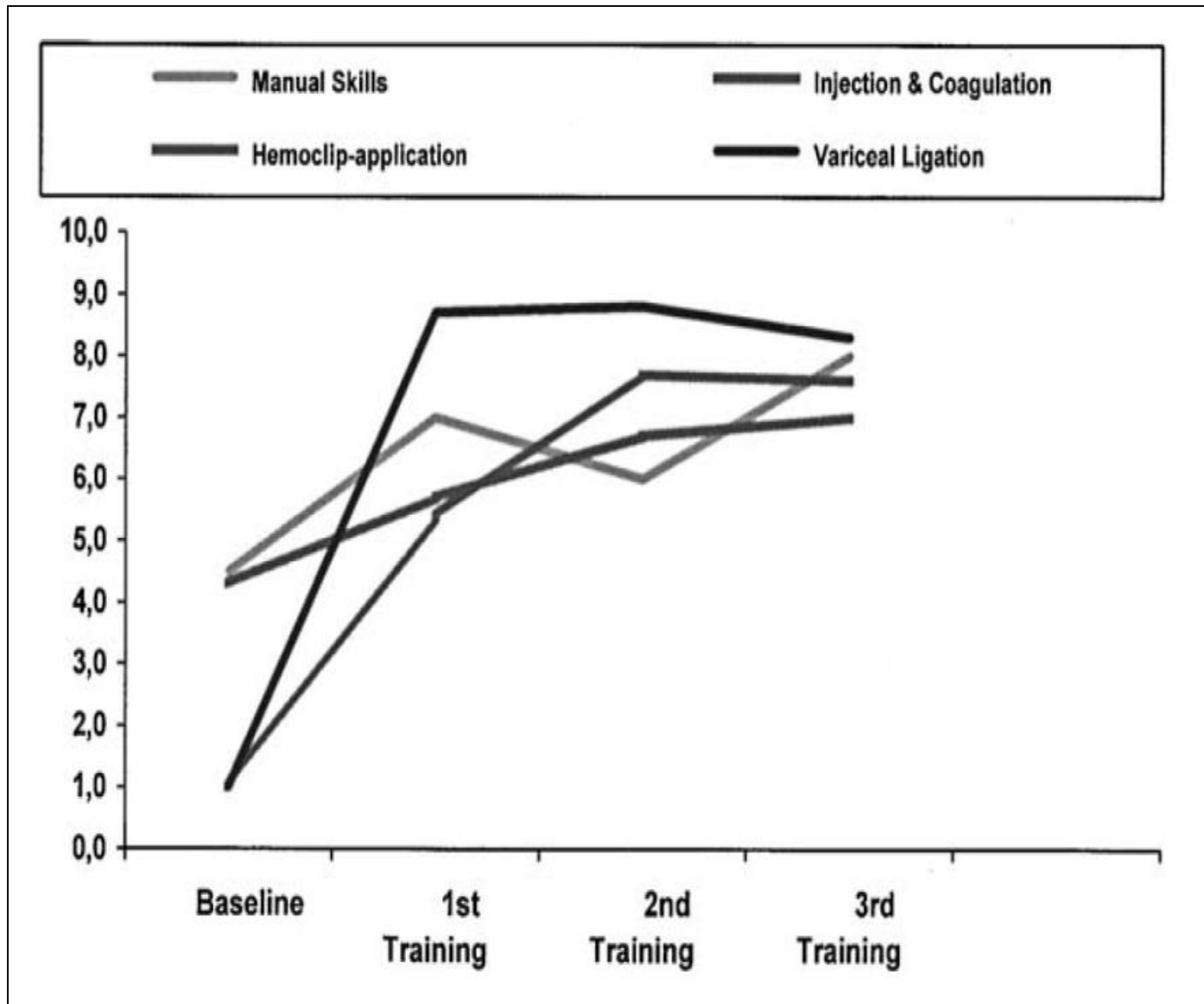
AND IT'S FUN !!!

Study on impact of simulators in training



Training with simulator: saves time, patient discomfort & potential complication

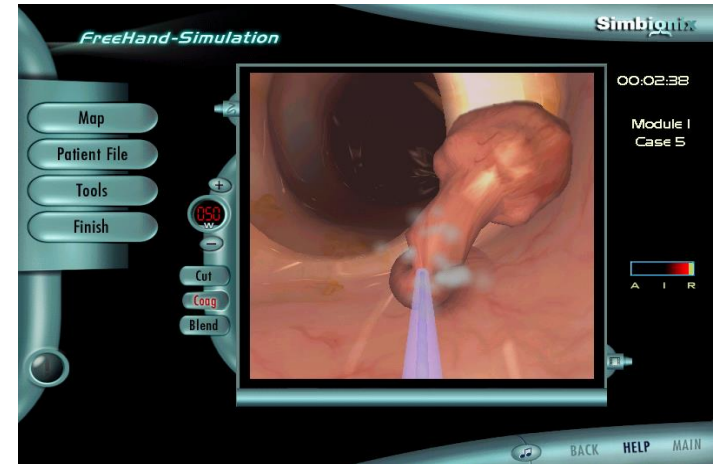
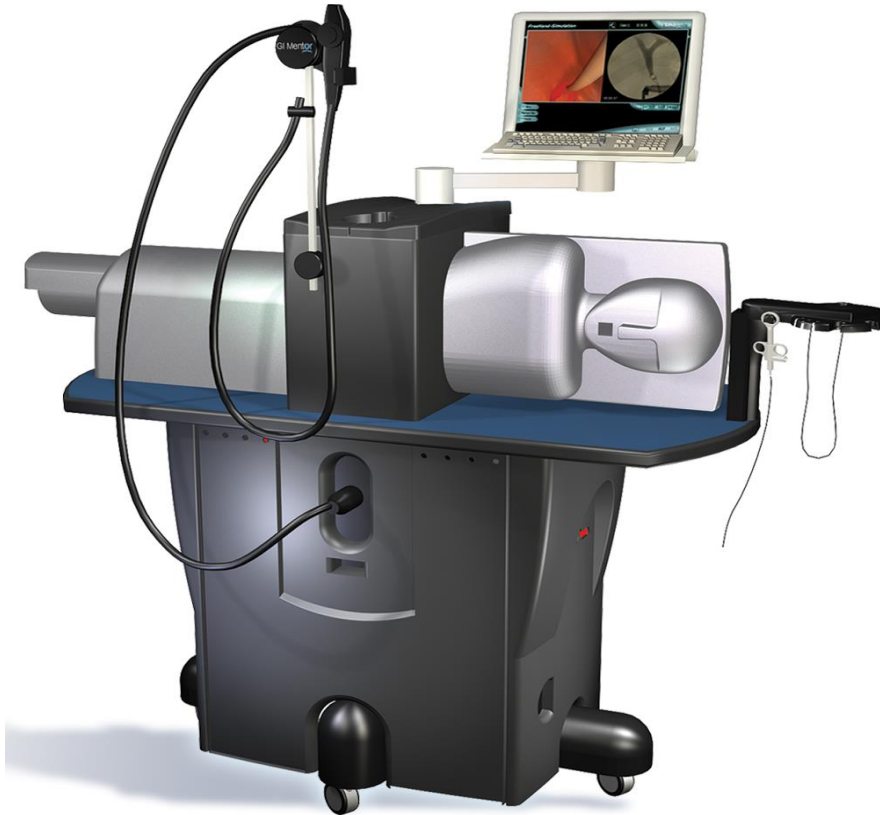
E
v
a
l
u
a
t
i
o
n

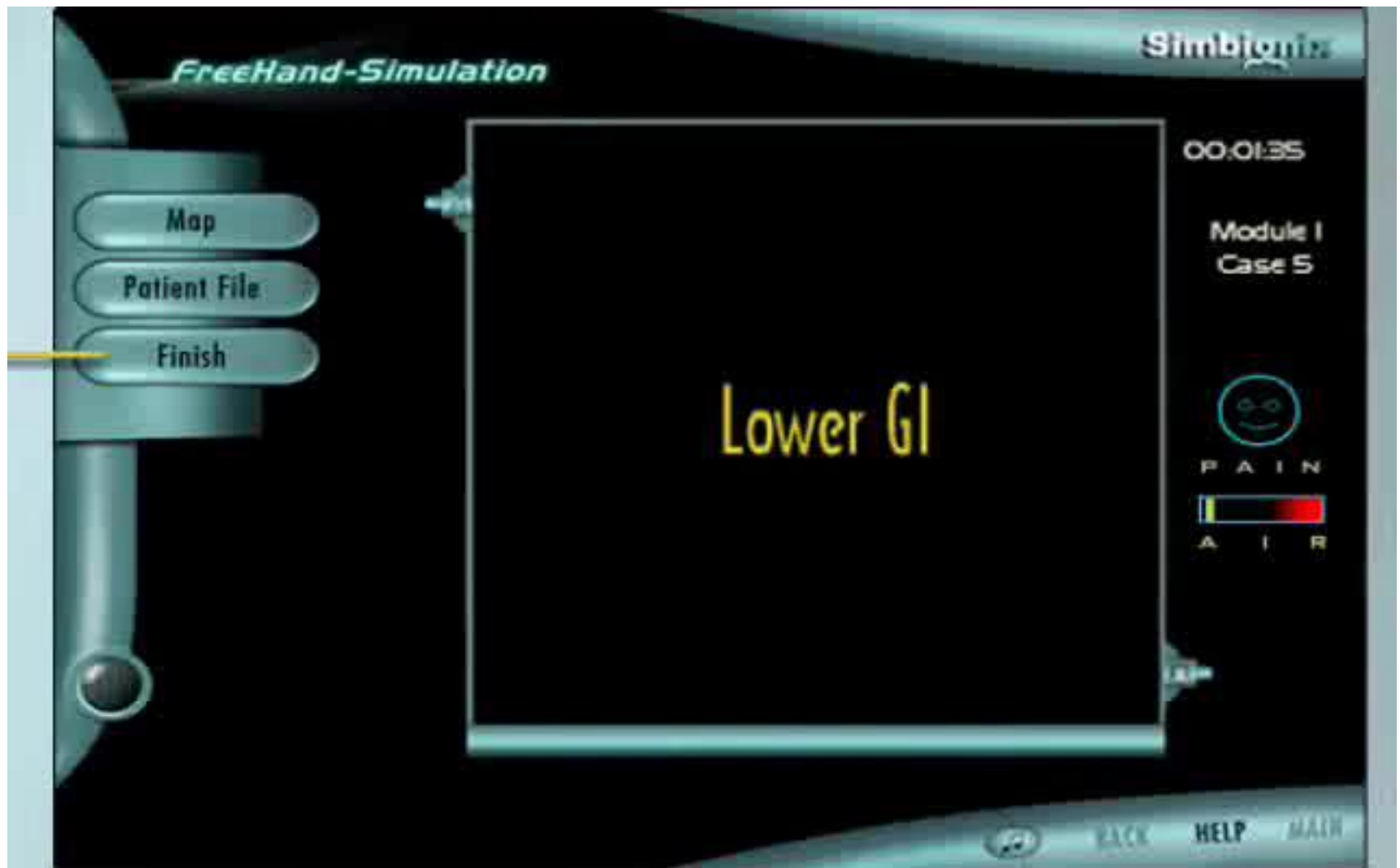


Available computerized virtual simulators

Simulator	Manufacturer	Procedures available	Strengths	Limitations
Computer simulators				
GI Mentor	Simbionix USA	EGD, colonoscopy, hemostasis, ERCP, EUS	<ul style="list-style-type: none"> • Teaching early skills • Ready on demand 	<ul style="list-style-type: none"> • Cost of simulator and modules • Assessment abilities limited • Limited teaching beyond basic navigation skills
Endo VR (formerly AccuTouch)	CAE Healthcare (formerly Immersion Med.)	EGD, colonoscopy, hemostasis		

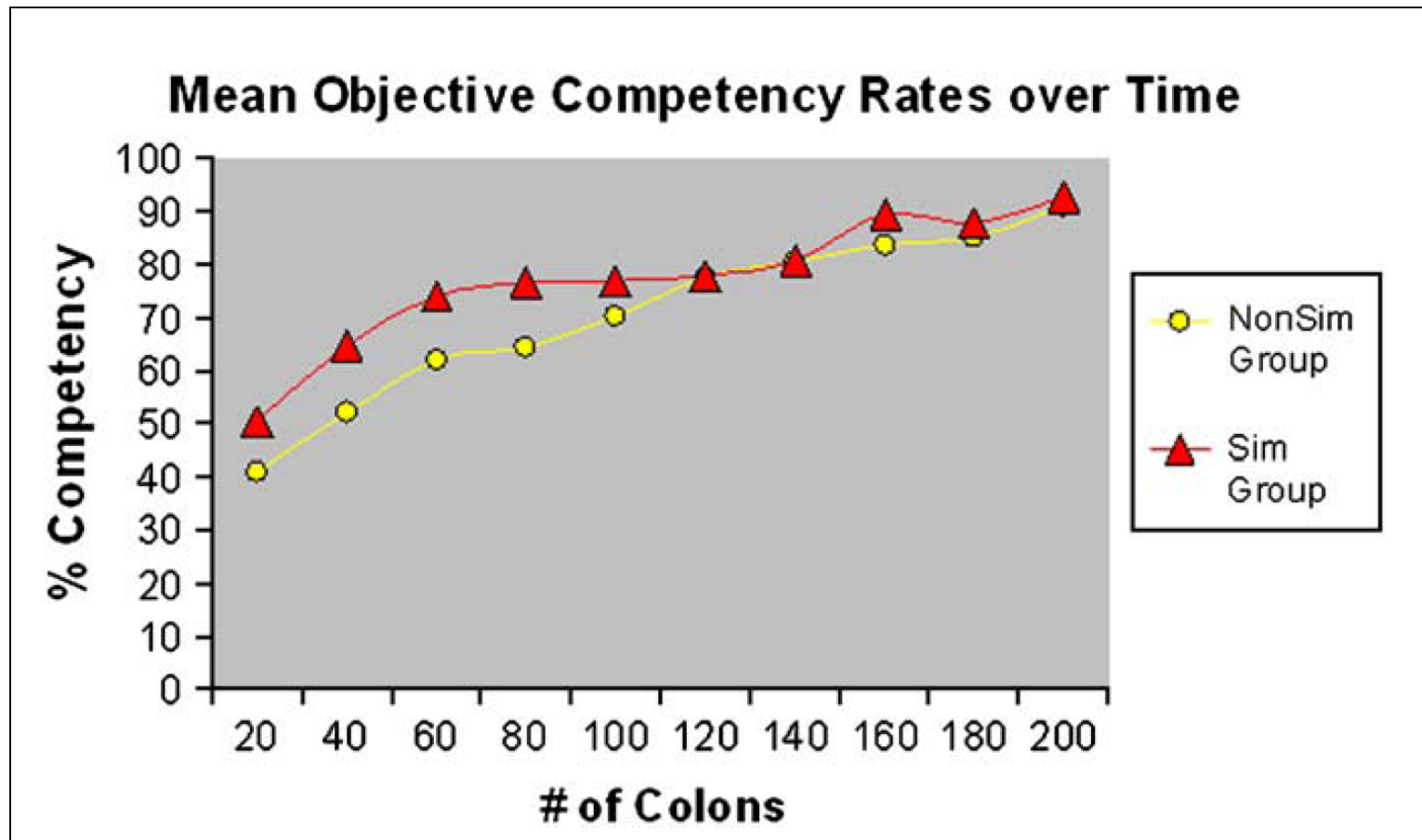
Forced feedback computer simulators





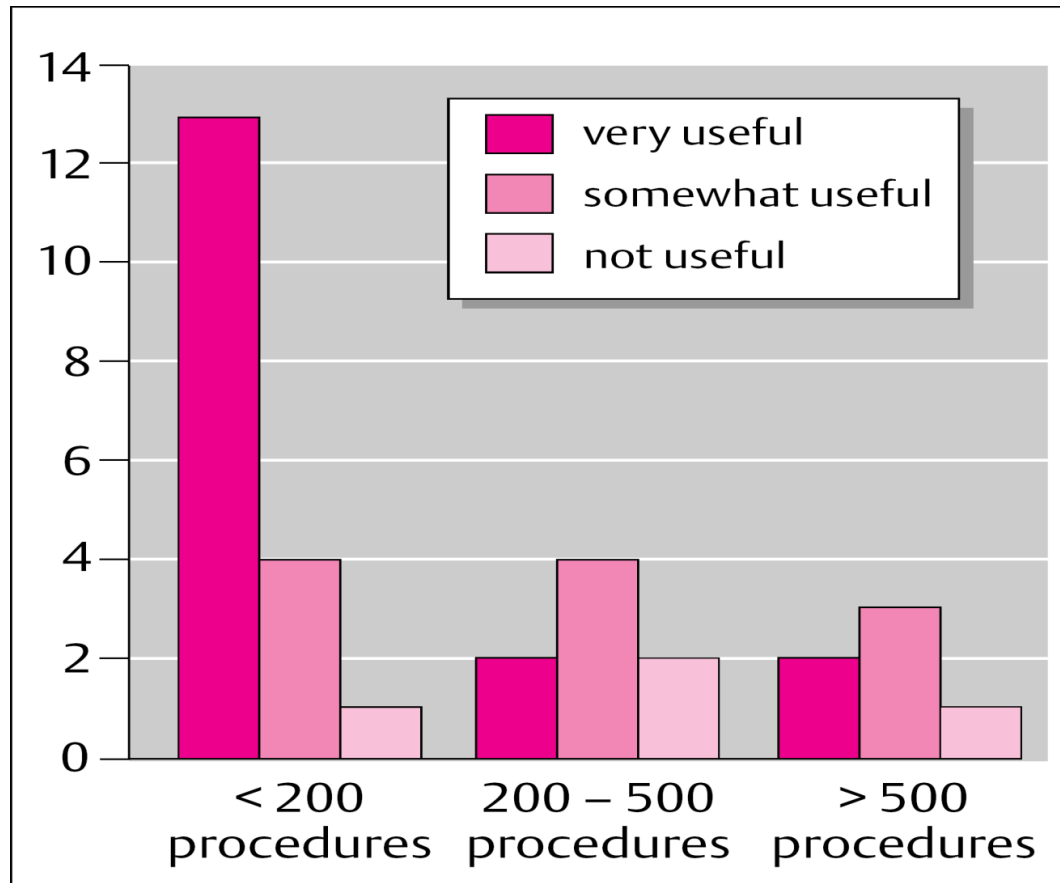
Simbionix innovated the modeling of computer generated internal organs in a non-rigid, dynamic virtual reality. Real-time images simulate stretching, inflation, deflation and contraction of the digestive tract during procedures.

Virtual reality simulation training: enhances early learning curve for real colonoscopy



Cohen J., et al Gastrointest Endosc 2006

Performance of a Colonoscopy Simulator: Experience from a Hands-On Endoscopy Course



Aabakken L et al Endoscopy 2000

Pros and Cons of Virtual Reality Simulators

Advantages

- Safe, easy to setup and maintain
- Allow feedback on loops, pain, lumen visualization

Disadvantages

- Too easy for non-novices
- Way too expensive!!!

Comparison of Simulators

	Mechanical	Bio-simulator	Computers
Cost	Low	++	+++
Diagnostic	+++	++	+++
Therapeutic	—	+++	++
Real tissue feel	—	+++	+
Maintenance	+++	+	++

Optimal Use of a simulators ?

- Take the best of each model

Mechanical Models & Computer Simulators

- Introduction for novices in scope dials & manipulation, loop withdrawal
- Basic and precision skills

Ex-Vivo Models

- Introduction to therapeutic techniques
- Training in new devices & techniques

Putting it all together: The hands-on workshop



Ex-vivo Training at the ITT Center. ASGE

Hands-on workshop: materials

- Mechanical models own or borrow from industry
- Ex vivo platforms:
[own or rent, inexpensive plastic trays]
- Obtaining tissue: frozen or in preservative /
cleaning specimen and need rinsing in saline
- Endoscopic equipment & accessories

Lessons from ex-vivo workshops

- Hands-on work is not sufficient to learn
- Other necessary elements:
 - Didactic pre-course video presentation
 - Sufficient time for trainees with scope feedback
 - Assessment of progress
 - Teachers who KNOW HOW TO TEACH AND HOW TO USE THE MODELS!!!

Proper technique must be demonstrated before practice

- Opportunity to use mechanical model
- Ex vivo manipulation (knives, injection needles, clips)
- Begin with expert demonstration breaking down the technique into component steps.
- Students have enough time to practice

Conclusions

- Types of available simulators
 - Animals / Mechanical / Ex-vivo biosimulators / Computers
- Usage, capabilities and limitations
 - Advantages & limitations / basic & advanced skills / precision / complications / low & high cost
- Incorporation into endoscopic training: YES

Take home

- Selection of simulator based on individual needs
- Simulators can (should) be incorporated into endoscopic training
- The best simulator (role model) for your trainee is yourself