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Video Article

Assemblage of a functional and versatile endoscopy trainer reusing medical waste: Step-by-step video tutorial

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BRIEF EXPLANATION

ENDOSCOPY SIMULATORS ARE progressively being integrated into training programs since they provide a safe and controlled learning environment for trainees to acquire and refine endoscopic skills necessary for complex interventions.[1–3] While several valid endoscopy trainers have been developed, their widespread availability can be limited by local resources.[4] Here we provide a step-by-step guide to assemble a simple and inexpensive endoscopy trainer using medical waste and expired clinic materials (Fig. 1). This project was developed within the "Take Instead of Discard" program at University Hospital LMU Munich, a sustainability initiative incentivizing the reuse of medical equipment packaging for various purposes.

An ex vivo endoscopy trainer is assembled by initially drilling a hole in the bottom of the side wall of a plastic box, enlarging it with a step drill to match the diameter of a 20 mL syringe. The syringe serves as the oral/anal orifice and is firmly attached to the box with plaster. To enhance stability, an additional box is adapted upside-down to elevate the platform where the organ is positioned. Organs from pigs or cows, after appropriate preparation, can be fixed to the syringe using a cable tie. For optimal lumen insufflation, a tourniquet is utilized to maintain airtightness by reducing the proximal organ's lumen. Finally, a grounding electrode for electrosurgical devices is attached to the organ (Video S1). The versatile functionality of this trainer enables the simulation of different procedures. We demonstrate its adaptability through three examples: (i) gastric endoscopic submucosal dissection in a porcine stomach; (ii) polypectomy by endoscopic mucosal resection in a bovine colon; and (iii) peroral endoscopic myotomy using a porcine esophagus (Fig. 2, Video S1). In summary, this do-it-yourself tutorial ensures the development of a cost-effective, sustainable, and widely accessible endoscopy simulator, aiding trainees in mastering both basic and advanced skills. Our model might enable valid endoscopy training even in underdeveloped health-care systems.

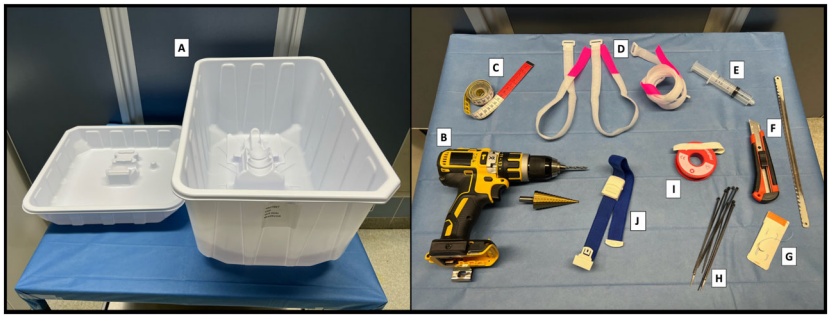

Figure 1 Material used to assemble the endoscopy simulator. (A) Plastic boxes.† (B) Electric drill with high-speed steel (HSS) step drill bit. (C) Tape measure. (D) Velcro ties.† (E) 20 mL plastic syringe.‡ (F) Cutting tools (cutter, hacksaw). (G) Surgical sutures.‡ (H) Cable ties. (I) Strong plaster. (J) Tourniquet. †Material recovered from medical waste, in this case from packaging of a heart-lung machine. ‡Expired material.

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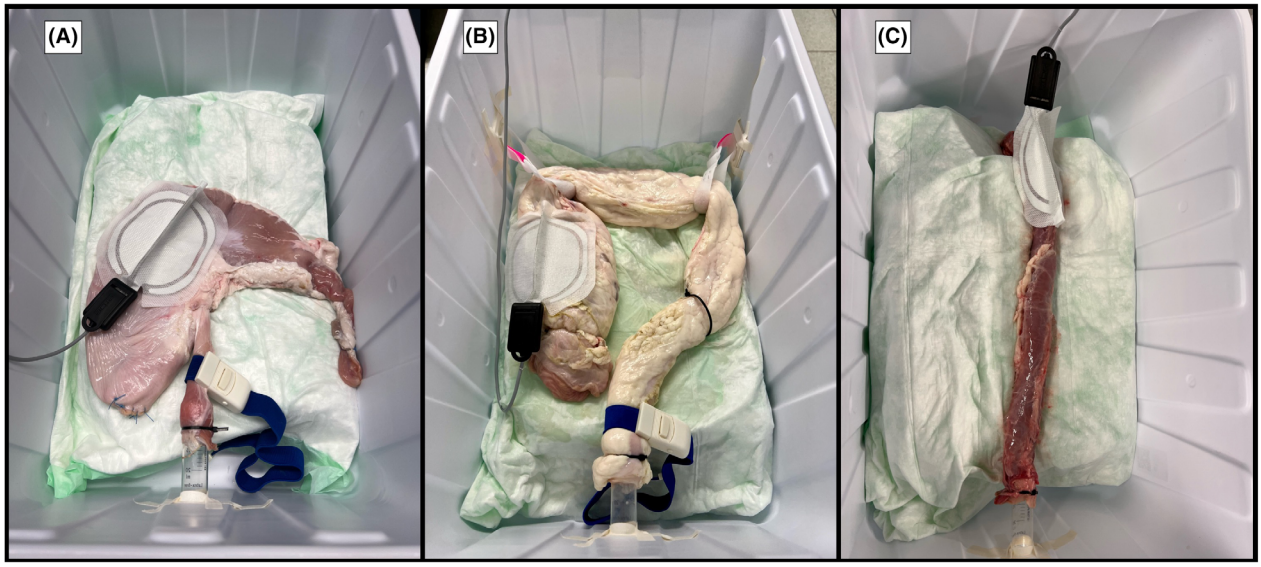

Figure 2 Different possible configurations of the trainer: (A) gastric model (porcine stomach); (B) colon model (bovine colon); and (C) esophageal model (porcine esophagus).

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SUPPORTING INFORMATION

ADDITIONAL SUPPORTING INFORMATION may be found in the online version of this article at the publisher's web site.

Video S1 Assemblage of an ex vivo endoscopy trainer using recycled materials. Several endoscopic procedures can be simulated. Here we demonstrate the feasibility of endoscopic submucosal dissection, hot-snare endoscopic mucosal resection, and peroral endoscopic myotomy techniques with this trainer.