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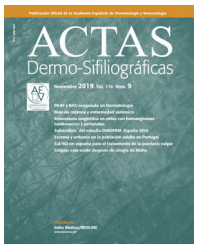

RESIDENT'S FORUM

Surgical Simulation and Digital Tools for Surgical Training During the COVID-19 Pandemic☆

FR-Técnicas de simulación quirúrgica y herramientas digitales como alternativa en la formación quirúrgica durante la pandemia COVID-19

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The COVID-19 pandemic has reduced opportunities for residency training and surgical training in particular in various specialities, including dermatology. Surgical skills can be negatively affected if not practiced during this critical learning period.[1] Numerous specialities have incorporated surgical simulation into resident training programs in recent years,[2] providing the opportunity to practice on cadaveric models or artificial tissues, experiment, and acquire and refine skills under the guidance and appraisal of a tutor. Simulation can be combined with digital technologies to further enhance learning and assessment opportunities. Despite their usefulness, however, these models been used very little in dermatology training.

García-Lozano et al.[1] recently described a program created to teach surgical techniques to dermatology residents during the COVID-19 pandemic. The program involves the use of illustrative web-based videos on surgical techniques and problem-solving scenarios in which residents design flaps using a simulator bust model (Diaphanous Zsa Zsa, DermSurg Scientific). Prior to this, Nicholas et al.[3] conducted a cross-sectional study to assess the perceived usefulness of surgical simulation using the Il Duoma simulator bust model (IL Duomo, DermSurg Scientific) during a 2-day training symposium attended by residents and staff. Over 90% of the participants surveyed were of the opinion that simulators are a powerful and helpful educational tool and thought they should be mandatory in residency training programs, especially during the early months. Liu et al.[4] conducted a prospective multicenter study evaluating the impact of instructional videos on types of flaps and surgical techniques followed by surgical simulation for first- and second-year dermatology residents. The residents were assessed using the validated Objective Structured Assessment of Technical Skills (OSATS) instrument before and after the program

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Table 1 Proposed Surgical Training Model Combining Simulation and Online Tools.

Step 1	Review surgical techniques and anatomy using digital tools: online videos and presentations
Step 2	Perform surgical simulation using animals, cadavers, and artificial material such as human bust models. Record the procedure with a camera attached to the trainee's forehead.
Step 3	Watch the recording with a staff member and other residents. Discuss positive aspects and areas for improvement. Assessment.

and completed a questionnaire on self-reported level of operative confidence and perceived value of this new training approach. The median OSATS score increased from 27 before the program to 46 afterwards ($P < .001$) and the questionnaires showed high levels of satisfaction and increased confidence among the residents. The procedures can be recorded with a GoPro-type camera attached to the resident's forehead during simulation, helping them to visualize and analyze in detail the intervention in first person together with a member of staff to identify techniques that need improvement (Table 1)[5].

Simulation can also be very useful for practicing aesthetic dermatology procedures, with studies showing successful results for simulations based on bust models or cadaveric material, such as pig heads, to practice botulinum toxin injection. Similar animal models have also been used to teach procedures such as laser and chemical peels.[2]

Other simulation modalities such as advanced virtual and augmented reality simulations have proven very effective in other surgical specialties.[2]

The COVID-19 pandemic will undoubtedly change medical education delivery. The combination of stimulation-based training and digital tools could revolutionize the teaching of dermatologic surgery, while reducing associated risks and favoring the acquisition of uniform skills among residents.

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