


Teaching Minor Skin Surgery Using a Novel Pork Belly Simulation Model

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Setting and Problem

Minor skin surgery procedures (such as excisional, shave, and punch biopsy) are required components of several residency training programs, requiring that residents competently and independently perform these procedures prior to graduation. Procedural skills teaching through simulation has become an educational standard in graduate medical education. Prior studies have examined the effectiveness of various skin surgery simulations including virtual reality, robotics, computer games, artificial and organic skin, cadavers, and wound closure pads—their success often depends on the accuracy of their texture and handling.¹ While some simulation models are convenient and reusable, many are either unrealistic or expensive, especially for training programs in resource-limited settings. Furthermore, some simulation models require significant investment of time and resources to obtain proficiency in teaching. Ideal simulation models are affordable and provide the most realistic experience possible. We describe the development of a realistic and inexpensive full-thickness pork belly model developed for minor surgery teaching in a suburban, community-based family medicine residency program in San Diego, California. This model is applicable to other residency training programs where residents may be required to demonstrate competence performing minor skin surgery techniques.

Intervention

A pork belly model that more closely mimics the contour of the human body was developed. A total of 5 models were constructed with 12-ounce cuts of pork belly (obtained from a butcher shop), common boards, and bungee cords at less than \$15 USD per model.² To mimic cystic lesions, a water balloon filled with cottage cheese and water was tied and placed between the skin and muscle layers (FIGURE). Study authors and postgraduate year (PGY) 3 residents conducted a

90-minute workshop for PGY-1 and PGY-2 residents in 2021 and for PGY-1 residents in 2022. Resident surveys showed very limited minor surgery experience at baseline, including for early PGY-2 residents who had truncated minor surgery experiences during PGY-1 due to the COVID-19 pandemic. This simulation training was provided to residents prior to their core surgery rotation because that rotation includes time in minor surgery clinic. A survey tool measured resident perceived self-confidence using a 10-point Likert scale, pre- and post-training for 6 micro-skills per procedure, and 1 descriptive question. Mean differences were analyzed using a 1-tailed *t* test. The first 2 graduating classes completing the trainings were surveyed at the time of graduation in 2022 and 2023, respectively, to measure longitudinal impact of this simulation training. The Kaiser Permanente Institutional Review Board granted this project exemption.

Outcomes to Date

All workshop participants completed the evaluation survey (N=18), and resident data from years 1 and 2 were pooled for analysis. Average mean increases for surgical micro-skills post-workshop were 3.53 ($P=.003$) and 3.07 ($P=.001$), for excisional and shave biopsy,

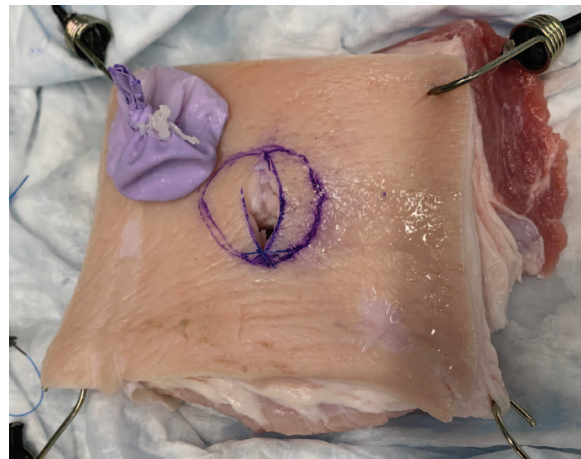


FIGURE
Pork Belly Simulation Model for Excisional Biopsy. Status: Post-Removal of Cottage Cheese-Filled Water Balloon Mimicking Sebaceous Cyst

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Editor's Note: The online supplementary data contains the design of the pork belly model for excisional and shave biopsy.

respectively. Thematic analysis of qualitative responses revealed that the most likely practice changes resulting from this training were related to methodology of injecting anesthetic, equipment handling, and incision/excision technique. Among the first 2 resident cohorts surveyed upon graduation, 10 of 12 graduates (83%) completed the exit survey, and all responded positively (either Agree or Strongly Agree) to the statement: “The minor skin surgery workshop enhanced my procedural skills in addition to the mentorship received in clinic.” Overall, full-thickness pork belly specimens offer a realistic, feasible, and cost-effective model for teaching minor skin surgery techniques to residents. Training programs can implement this model using the resources provided by study authors on the STFM Resource Library² and in the online supplementary data. This model is not only inexpensive but also allows for all phases of skin surgery procedures to be performed, including patient preparation, anesthesia, draping, equipment handling, and dressing.

References

1. Khunger N, Kathuria S. Mastering surgical skills through simulation-based learning: practice makes one perfect. *J Cutan Aesthet Surg*. 2016;9(1):27-31. doi:10.4103/0974-2077.178540
2. STFM Resource Library. Bui N, Sazegar P. Realistic Simulation for Minor Surgery Teaching: Design and Evaluation of a Novel Pork Belly Model. Accessed October 8, 2024. <https://resourcelibrary.stfm.org/resource-library/ourlibrary/viewdocument?DocumentKey=81b44088-4671-465b-9d8c-01872a039bb6>



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