

Supplemental Material

S1 Table: Meta-Analysis:

List of all papers included in the analysis including details on origin, year of publication and trained skill.

Publication	Year	Speciality	Skill	Continent	Animal
Araujo, S. E., et al. (2014). "Short-duration virtual reality simulation training positively impacts performance during laparoscopic colectomy in animal model: results of a single-blinded randomized trial : VR warm-up for laparoscopic colectomy." Surg Endosc 28(9): 2547-2554.	2014	Abdominal	Laparoscopic surgery	South America	porcine
Camus, M., et al. (2013). "Validation of a live animal model for training in endoscopic hemostasis of upper gastrointestinal bleeding ulcers." Endoscopy 45(6): 451-457.	2013	Abdominal	Endoscopic surgery	Europe	porcine
Cruz, J. A., et al. (2012). "Surgical performance during laparoscopic radical nephrectomy is improved with training in a porcine model." J Endourol 26(3): 278-282.	2012	Abdominal	Laparoscopic surgery	South America	lapine (rabbit)
de la Torre, M., et al. (2014). "Uniportal video-assisted thoracoscopic lobectomy in the animal model." J Thorac Dis 6(Suppl 6): S656-659.	2014	Cardiothoracic	Endoscopic surgery	Europe	ovine
Diaz-Guemes Martin-Portugues, I., et al. (2013). "Ureteral obstruction swine model through laparoscopy and single port for training on laparoscopic pyeloplasty." Int J Med Sci 10(8): 1047-1052.	2013	Urology	Laparoscopic surgery	Europe	porcine
Enciso, S., et al. (2016). "Validation of a model of intensive training in digestive laparoscopic surgery." Cir Esp 94(2): 70-76.	2016	Abdominal	Laparoscopic surgery	Europe	porcine
Esposito, C., et al. (2016). "Training Models in Pediatric Minimally Invasive Surgery: Rabbit Model Versus Porcine Model: A Comparative Study." J Laparoendosc Adv Surg Tech A 26(1): 79-84.	2016	Abdominal	Laparoscopic surgery	Europe	porcine
Fearn, S. J., et al. (2006). "A laparoscopic access technique for endovascular procedures: surgeon training in an animal model." J Endovasc Ther 13(3): 350-356.	2006	Abdominal	Laparoscopic surgery	Australia	porcine
Fernandez-Miranda, J. C., et al. (2010). "Animal model for endoscopic neurosurgical training: technical note." Minim Invasive Neurosurg 53(5-6): 286-289.	2010	Neurosurgery	Endoscopic surgery	North America	murine (rat)
Foletti, J. M., et al. (2013). "Endoscopic treatment of mandibular condylar fractures in live minipigs: benefits of the operative learning curve." Br J Oral Maxillofac Surg 51(7): 630-633.	2013	Trauma & Reconstructive	Endoscopic surgery	Europe	porcine
Fu, B., et al. (2007). "New model for training in laparoscopic dismembered ureteropyeloplasty." J Endourol 21(11): 1381-1385.	2007	Urology	Laparoscopic surgery	Asia	porcine
Hall, A. B. (2011). "Randomized objective comparison of live tissue training versus simulators for emergency procedures." Am Surg 77(5): 561-565.	2011	Cardiothoracic	Open surgery	North America	porcine
Heinrich, M., et al. (2006). "Comparison of different training models for laparoscopic surgery in neonates and small infants." Surg Endosc 20(4): 641-644.	2006	Abdominal	Laparoscopic surgery	Europe	lapine (rabbit)
Hernandez Mondragon, O. V., et al. (2015). "The Per Oral Endoscopic Myotomy (POEM) technique: how many preclinical procedures are needed to master it?" Endosc Int Open 3(6): E559-565.	2015	Abdominal	Endoscopic surgery	North America	porcine

Izawa, Y., et al. (2016). "Ex-vivo and live animal models are equally effective training for the management of a penetrating cardiac injury." <i>World J Emerg Surg</i> 11(1): 45.	2016	Cardiothoracic	Open surgery	Asia	porcine
Kajiwar, N., et al. (2011). "Training in robotic surgery using the da Vinci® surgical system for left pneumonectomy and lymph node dissection in an animal model." <i>Ann Thorac Cardiovasc Surg</i> 17(5): 446-453.	2011	Cardiothoracic	Robotic surgery	Asia	porcine
Kirlum, H. J., et al. (2005). "Advanced paediatric laparoscopic surgery: repetitive training in a rabbit model provides superior skills for live operations." <i>Eur J Pediatr Surg</i> 15(3): 149-152.	2005	Abdominal	Laparoscopic surgery	Europe	lapine (rabbit)
La Torre, M. and C. Caruso (2012). "Resident training in laparoscopic colorectal surgery: role of the porcine model." <i>World J Surg</i> 36(9): 2015-2020.	2012	Abdominal	Laparoscopic surgery	Europe	porcine
Leclerc, F. M., et al. (2013). "Microsurgery and liver research: <i>Lumbricus terrestris</i> , a reliable animal model for training?" <i>Clin Res Hepatol Gastroenterol</i> 37(2): 166-170.	2013	Abdominal	Microsurgery	Europe	misc
Leclerc, F. M., et al. (2013). "Is there good simulation basic training for end-to-side vascular microanastomoses?" <i>Aesthetic Plast Surg</i> 37(2): 454-458.	2013	Trauma & Reconstructive	Microsurgery	Europe	misc
Liu, X., et al. (2016). "A Secure and High-Fidelity Live Animal Model for Off-Pump Coronary Bypass Surgery Training." <i>J Surg Educ</i> 73(4): 583-588.	2016	Cardiothoracic	Microsurgery	Asia	porcine
Marchini, G. S., et al. (2016). "Specific training for LESS surgery results from a prospective study in the animal model." <i>Int Braz J Urol</i> 42(1): 90-95.	2016	Urology	Laparoscopic surgery	South America	porcine
Mehrabi, A., et al. (2006). "Development and evaluation of a training module for the clinical introduction of the da Vinci robotic system in visceral and vascular surgery." <i>Surg Endosc</i> 20(9): 1376-1382.	2006	Abdominal	Robotic surgery	Europe	murine (rat)
Passerotti, C. C., et al. (2009). "Comparing the quality of the suture anastomosis and the learning curves associated with performing open, freehand, and robotic-assisted laparoscopic pyeloplasty in a swine animal model." <i>J Am Coll Surg</i> 208(4): 576-586.	2009	Urology	Laparoscopic surgery	North America	porcine
Training microneurosurgery - four years experiences with an in vivo model. Regelsberger , Heese O, Horn P, Kirsch M, Eicker S, Sabel M, Westphal M.	2011	Neurosurgery	Microsurgery	Europe	porcine
Regelsberger, J., et al. (2015). "In vivo porcine training model for cranial neurosurgery." <i>Neurosurg Rev</i> 38(1): 157-163; discussion 163.	2015	Neurosurgery	Microsurgery	Europe	porcine
Ricetto, C. L., et al. (2007). "Experimental animal model for training transobturator and retropubic sling techniques." <i>Urol Int</i> 78(2): 130-134.	2007	Urology	Open surgery	South America	ovine
Rosenberg, J., et al. (2013). "An animal model to train Lichtenstein inguinal hernia repair." <i>Hernia</i> 17(2): 255-258.	2013	Abdominal	Open surgery	Europe	porcine
Ryska, O., et al. (2016). "A new experimental model of calculous cholecystitis suitable for the evaluation and training of minimally invasive approaches to cholecystectomy." <i>Surg Endosc</i> .	2016	Abdominal	Laparoscopic surgery	Europe	porcine
Schleimer, K., et al. (2012). "Training a sophisticated microsurgical technique: interposition of external jugular vein graft in the common carotid artery in rats." <i>J Vis Exp</i> (69).	2012	Trauma & Reconstructive	Microsurgery	Europe	murine (rat)

Simforoosh, N., et al. (2011). "Laparoscopic animal surgery for training without sacrificing animals; introducing the rabbit as a model for infantile laparoscopy." J Laparoendosc Adv Surg Tech A 21(10): 929-933.	2011	Abdominal	Laparoscopic surgery	Asia	lapine (rabbit)
Soria, F., et al. (2015). "Development and Validation of a Novel Skills Training Model for Retrograde Intrarenal Surgery." J Endourol 29(11): 1276-1281.	2015	Urology	Endoscopic surgery	Europe	porcine
Spetzger, U., et al. (2011). "Training models for vascular microneurosurgery." Acta Neurochir Suppl 112: 115-119.	2011	Neurosurgery	Microsurgery	Europe	lapine (rabbit)
Sundermann, S. H., et al. (2016). "Two- and three-dimensional transoesophageal echocardiography in large swine used as model for transcatheter heart valve therapies: standard planes and values." Interact Cardiovasc Thorac Surg 22(5): 580-586.	2016	Cardiothoracic	Diagnostics	Europe	porcine
Tedde, M. L., et al. (2015). "Video-assisted thoracoscopic surgery in swine: an animal model for thoracoscopic lobectomy training." Interact Cardiovasc Thorac Surg 21(2): 224-230.	2015	Cardiothoracic	Endoscopic surgery	South America	porcine
Teh, S. H., et al. (2007). "A suitable animal model for laparoscopic hepatic resection training." Surg Endosc 21(10): 1738-1744.	2007	Abdominal	Laparoscopic surgery	North America	ovine
La Torre M ¹ , Caruso C (2013).The animal model in advanced laparoscopy resident training.Surg Laparosc Endosc Percutan Tech. 2013 Jun;23(3):271-5. doi: 10.1097/SLE.0b013e31828b895b.	2013	Abdominal	Laparoscopic surgery	Europe	porcine
Park J ¹ , Yim S, Eun SC. 2016 Experimental Design for Composite Face Transplantation J Craniofac Surg. 2016 Jun;27(4):843-5.	2016	Trauma & Reconstructive	Open surgery	Asia	porcine
Mouraviev V, Klein M, Schommer E, Thiel DD, Samavedi S, Kumar A, Leveillee RJ, Thomas R, Pow-Sang JM, Su LM, Mui E, Smith R, Patel V.Urology residents experience comparable workload profiles when performing live porcine nephrectomies and robotic surgery virtual reality training modules.J Robot Surg. 2016 Mar;10(1):49-56. doi: 10.1007/s11701-015-0540-1. Epub 2016 Jan 11.	2016	Urology	Robotic surgery	North America	porcine
Jaimovich SG, Bailez M, Asprea M, Jaimovich R. Neurosurgical training with simulators: a novel neuroendoscopy model.Childs Nerv Syst. 2016 Feb;32(2):345-9. doi: 10.1007/s00381-015-2936-7. Epub 2015 Oct 22.	2015	Neurosurgery	Endoscopic surgery	South america	murine (rat)
Rosenberg J, Presch I, Pommergaard HC, Burcharth J, Bagot d'Arc M.An animal model to train Lichtenstein inguinal hernia repair.Hernia. 2013 Apr;17(2):255-8. doi: 10.1007/s10029-012-0981-7. Epub 2012 Aug 21	2013	Abdominal	Open surgery	europe	porcine
Baek RM, Eun SC, Heo CY, Chang H.Experimental facial transplantation surgery.J Craniofac Surg. 2010 May;21(3):648-51. doi: 10.1097/SCS.0b013e3181d84010.	2010	Trauma & Reconstructive	Microsurgery	Asia	lapine (rabbit)
Vázquez-Sequeiros E, de Miquel DB, Olcina JR, Martín JA, García M, Lucas DJ, Garrido E, González C, Blanco AP, Arnau MR, Buenadicha A, Vicente VM, de Argila CM, Milicua JM.Training model for teaching endoscopic submucosal dissection of gastric tumors.Rev Esp Enferm Dig. 2009 Aug;101(8):546-52.	2009	Abdominal	Laparoscopic surgery	Europe	porcine
Zhang X, Wang B, Ma X, Zhang G, Shi T, Ju Z, Wang C, Li H, Ai X, Fu B.Laparoscopic adrenalectomy for beginners without open counterpart experience: initial results under staged training.Urology. 2009 May;73(5):1061-5. doi: 10.1016/j.urology.2008.11.058.	2009	Urology	Laparoscopic surgery	Asia	porcine

Zhang X, Zhang GX, Wang BJ, Ma X, Fu B, Shi TP, Lang B, Wang C, Ju ZH, Ai X, Wu Z.A multimodal training program for laparoscopic pyeloplasty.J Endourol. 2009 Feb;23(2):307-11. doi: 10.1089/end.2008.0356.	2009	Urology	Laparoscopic surgery	Asia	porcine
Hall AB, Riojas R, Sharon D.Comparison of self-efficacy and its improvement after artificial simulator or live animal model emergency procedure training.Mil Med. 2014 Mar;179(3):320-3. doi: 10.7205/MILMED-D-12-00446.	2014	Trauma & Reconstructive	Open surgery	North America	porcine
Van Bruwaene S, Schijven MP, Napolitano D, De Win G, Miserez M Porcine cadaver organ or virtual-reality simulation training for laparoscopic cholecystectomy: a randomized, controlled trial.J Surg Educ. 2015 May-Jun;72(3):483-90. doi: 10.1016/j.jsurg.2014.11.015. Epub 2014 Dec 30.	2015	Abdominal	Laparoscopic surgery	Europe	porcine
Palter VN, Orzech N, Aggarwal R, Okrainec A, Grantcharov TP. Resident perceptions of advanced laparoscopic skills training.Surg Endosc. 2010 Nov;24(11):2830-4. doi: 10.1007/s00464-010-1058-2. Epub 2010 Apr 29.	2010	Abdominal	Laparoscopic surgery	North America	porcine
Phillips AB, Green J, Bergdall V, Yu J, Monreal G, Gerhardt M, Cheatham JP, Galantowicz M, Holzer RJ.Teaching the “hybrid approach”: a novel swine model of muscular ventricular septal defect.Pediatr Cardiol. 2009 Feb;30(2):114-8. doi: 10.1007/s00246-008-9297-x. Epub 2008 Aug 19.	2009	Cardiothoracic	Open surgery	North America	porcine
Chen VK, Marks JM, Wong RC, McGee MF, Faulx AL, Isenberg GA, Schomisc SJ, Deng CX, Ponsky JL, Chak A.Creation of an effective and reproducible nonsurvival porcine model that simulates actively bleeding peptic ulcers.Gastrointest Endosc. 2008 Sep;68(3):548-53. doi: 10.1016/j.gie.2008.03.1087. Epub 2008 Jul 11.	2008	Abdominal	Laparoscopic surgery	North America	porcine
Sterbis JR, Hanly EJ, Herman BC, Marohn MR, Broderick TJ, Shih SP, Harnett B, Doarn C, Schenkman NS.Transcontinental telesurgical nephrectomy using the da Vinci robot in a porcine model.Urology. 2008 May;71(5):971-3. doi: 10.1016/j.urology.2007.11.027. Epub 2008 Mar 4.	2008	Urology	Robotic surgery	North America	porcine
Rulli F, Cina G, Galatà G, Cina A, Vincenzoni C, Fiorentino A, Farinon AM.Teaching subfascial perforator veins surgery: survey on a 2-day hands-on course.ANZ J Surg. 2004 Dec;74(12):1116-9.	2004	Trauma & Reconstructive	Endoscopic surgery	Europe	porcine
Hanly EJ, Marohn MR, Bachman SL, Talamini MA, Hacker SO, Howard RS, Schenkman NS.Multiservice laparoscopic surgical training using the daVinci surgical system.Am J Surg. 2004 Feb;187(2):309-15.	2004	Abdominal	Robotic surgery	North America	porcine
Abu-Zidan, F. M., et al. (2004). “Establishment of a teaching animal model for sonographic diagnosis of trauma.” J Trauma 56(1): 99-104.	2004	Trauma & Reconstructive	Diagnostics	Asia	porcine
Alves, J. R., et al. (2012). “Animal model for training in sentinel lymph node biopsy of the stomach through combined methods.” Acta Cir Bras 27(12): 833-840.	2012	Abdominal	Open surgery	South America	lapine (rabbit)
Bodin, F., et al. (2015). “Porcine model for free-flap breast reconstruction training.” J Plast Reconstr Aesthet Surg 68(10): 1402-1409.	2015	Trauma & Reconstructive	Microsurgery	Europe	porcine
Clin Transplant. 2013 Jul-Aug;27 Suppl 25:6-15. doi: 10.1111/ctr.12155. Do we need animal hands-on courses for transplantation surgery? Golriz M, Hafezi M, Garoussi C, Fard N, Arvin J, Fonouni H, Nickkholgh A, Kulu Y, Frongia G, Schemmer P, Mehrabi A.	2013	Abdominal	Open surgery	Europe	porcine

J Surg Res. 2018 Feb;222:132-138. doi: 10.1016/j.jss.2017.09.042. Epub 2017 Nov 4. Establishment of laparoscopic live donor nephrectomy in a porcine model: techniques and outcomes in 44 pigs. Newman ME, Musk GC, He B.	2018	Abdominal	Laparoscopic surgery	Australia	porcine
Ann Thorac Surg. 2018 Feb;105(2):637-643. doi: 10.1016/j.athoracsur.2017.10.011. Epub 2017 Dec 21. Simulation and Deliberate Practice in a Porcine Model for Congenital Heart Surgery Training. Mavroudis CD, Mavroudis C, Jacobs JP, DeCampi WM, Tweddell JS	2018	Cardiothoracic	Open surgery	North America	porcine
Ann Chir Plast Esthet. 2018 Apr;63(2):113-116. doi: 10.1016/j.anplas.2017.11.010. Epub 2017 Dec 26. A porcine model for robotic training harvest of the rectus abdominis muscle. Louis V, Chih-Sheng L, Chevallier D, Selber JC, Xavier F, Liverneaux PA	2018	Trauma & Reconstructive	Robotic surgery	europe	porcine
J Robot Surg. 2018 Dec;12(4):693-698. doi: 10.1007/s11701-018-0806-5. Epub 2018 Mar 31. Robotic kidney autotransplantation in a porcine model: a procedure-specific training platform for the simulation of robotic intracorporeal vascular anastomosis. Tiong HY, Goh BYS, Chiong E, Tan LGL, Vathsala A	2018	Trauma & Reconstructive	Robotic surgery	Asia	porcine
González-García JA, Chiesa-Estomba CM, Álvarez L, Altuna X, García-Iza L, Thomas I, Sistiaga JA, Larruscain E. Porcine experimental model for perforator flap raising in reconstructive microsurgery.	2018	Trauma & Reconstructive	Microsurgery	europe	porcine
J Robot Surg. 2019 Apr;13(2):289-292. doi: 10.1007/s11701-018-0852-z. Epub 2018 Jul 16. Simulated management of urinary tract injury during robotic pelvic surgery utilizing the porcine model. Hoffman MS, Spiess PE	2018	Urology	Robotic surgery	North America	porcine
Tayebi Meybodi A, Aklinski J, Gandhi S, Preul MC, Lawton MT. Side-to-Side Anastomosis Training Model Using Rat Common Carotid Arteries. Oper Neurosurg (Hagerstown). 2019 Mar 1;16(3):345-350. doi: 10.1093/ons/opy157.	2019	Neurosurgery	Microsurgery	North America	murine (rat)
Leuzzi S, Maruccia M, Elia R, Annoscia P, Vestita M, Nacchiero E, Giudice G. Lymphatic-venous anastomosis in a rat model: A novel exercise for microsurgical training. J Surg Oncol. 2018 Nov;118(6):936-940. doi: 10.1002/jso.25234. Epub 2018 Sep 27.	2018	Trauma & Reconstructive	Microsurgery	Europe	murine (rat)
J Vis Exp. 2018 Sep 29;(139). doi: 10.3791/58104. Porcine As a Training Module for Head and Neck Microvascular Reconstruction. Alessa MA, Kwak SH, Lee YW, Kang ML, Sung HJ, Ahn SH, Choi EC, Kim WS.	2018	Trauma & Reconstructive	Microsurgery	Asia	porcine
Ear Nose Throat J. . doi: 10.1177/0145561319840835. Training Residents to Perform Tracheotomy Using a Live Swine Model. Cheng PC, Cho TY, Hsu WL, Lo WC, Wang CT, Cheng PW, Liao LJ.	2017	Cardiothoracic	Open surgery	Europe	porcine
Eur J Vasc Endovasc Surg. 2018 Sep;56(3):373-380. doi: 10.1016/j.ejvs.2018.05.024. Epub 2018 Jul 11. Experimental Evaluation of Endovascular Fenestration Scissors in an Ovine Model of Aortic Dissection. El Batti S, Ben Abdallah I, Dufetelle E, Julia P, Menasche P, Alsac JM.	2018	Trauma & Reconstructive	Microsurgery	Europe	porcine
Int J Surg. 2018 Dec;60:245-251. doi: 10.1016/j.ijssu.2018.11.017. Epub 2018 Nov 24.	2018	Abdominal	Open surgery	europe	porcine

Critical steps for initiating an animal uterine transplantation model in sheep: Experience from a case series. Favre-Inhofer A, Carbonnel M, Revaux A, Sandra O, Mougenot V, Bosc R, G�lin V, Rafii A, Hersant B, Vialard F, Chavatte-Palmer P, Richard C, Ayoubi JM					
Neurosurg Focus. 2019 Feb 1;46(2):E17. doi: 10.3171/2018.11.FOCUS18533. Novel rodent model for simulation of sylvian fissure dissection and cerebrovascular bypass under subarachnoid hemorrhage conditions: technical note and timing study. Perry A, Graffeo CS, Carlstrom LP, Anding WJ, Link MJ, Rangel-Castilla L	2019	neurosurgery	Microsurgery	North America	murine (rat)
Int Urogynecol J. 2017 Oct;28(10):1573-1577. doi: 10.1007/s00192-017-3313-8. Epub 2017 Mar 20. Feasibility and benefits of the ewe as a model for vaginal surgery training. Kerbage Y, Giraudet G, Rubod C, Garabedian C, Rivaux G, Cosson M.	2017	Urology	Open surgery	Europe	ovine
Transplant Proc. 2016 Nov;48(9):3053-3058. doi: 10.1016/j.transproceed.2016.07.032. Establishing the Number of Procedures for Optimal Renal Transplantation Training With the Use of a Canine Model. Ayala-Garcia MA, Soel-Encalada JM, Rios Zambudio A, Rodea-Montero ER, Gonzalez-Yebra B.	2016	Abdominal	Open surgery	North America	lapine (rabbit)
World J Gastrointest Surg. 2016 Nov 27;8(11):735-743. Impact of laparoscopic surgery training laboratory on surgeon's performance. Torricelli FC, Barbosa JA, Marchini GS.	2016	Abdominal	Laparoscopic surgery	South America	porcine
J Reconstr Microsurg. 2017 Jul;33(6):426-434. doi: 10.1055/s-0037-1599101. Epub 2017 Mar 10. A New Supermicrosurgery Training Model of Saphenous Artery and Great Saphenous Vein Anastomosis for Development of Advanced Microsurgical Skills. Bas CE, Cwykiel J, Siemionow M.	2017	Trauma & Reconstructive	Microsurgery	North America	murine (rat)
Int Urogynecol J. 2017 Oct;28(10):1595-1597. doi: 10.1007/s00192-017-3292-9. Epub 2017 Mar 14. Development of an ovine model for training in vaginal surgery for pelvic organ prolapse. Mansoor A, Curinier S, Campagne-Loiseau S, Platteeuw L, Jacquetin B, Rabischong B.	2017	Abdominal	Open surgery	Europe	ovine
Ann Plast Surg. 2017 Sep;79(3):298-303. doi: 10.1097/SAP.0000000000001133. Mastering Lymphatic Microsurgery: A New Training Model in Living Tissue. Campisi CC, Jiga LP, Ryan M, di Summa PG, Campisi C, Ionac M.	2017	Trauma & Reconstructive	Microsurgery	Europe	porcine
J Surg Educ. 2018 Jan - Feb;75(1):195-199. doi: 10.1016/j.jsurg.2017.06.029. Epub 2017 Jul 12. Surgical Training Improves Performance in Minimally Invasive Left Ventricular Assist Device Implantation Without Cardiopulmonary Bypass. Zhang LF, Feng HB, Yu ZG, Jing S, Wan F.	2018	Cardiothoracic	Microsurgery	Asia	porcine
Surg Innov. 2017 Oct;24(5):533-535. doi: 10.1177/1553350617723533. Epub 2017 Aug 2. Surgical Training With Live Animal Models for Laparoscopic Gastrectomy. Ueda Y, Shiraishi N, Hirashita T, Etoh T, Inomata M, Kitano S.	2017	Abdominal	Laparoscopic surgery	Asia	porcine
Asian J Endosc Surg. 2018 May;11(2):151-154. doi: 10.1111/ases.12433. Epub 2017 Oct 17. Proper training in laparoscopic hernia repair is necessary to minimize the rising recurrence rate in Japan.	2018	Abdominal	Laparoscopic surgery	Asia	porcine

Matsumoto S, Hayakawa T, Kawarada Y, Uchida K, Eguchi T, Wada H, Ueno N, Idani H, Nakano K, Oomomo Y.					
J Vis Surg. 2017 May 25;3:72. doi: 10.21037/jovs.2017.03.24. eCollection 2017. Swine model for training surgeons in minimally invasive anatomic lung segmentectomy. Oizumi H, Kato H, Endoh M, Suzuki J, Watarai H, Hamada A, Suzuki K, Nakahashi K, Sadahiro M.	2017	Cardiothoracic	Endoscopic surgery	Asia	porcine
Surg Laparosc Endosc Percutan Tech. 2018 Feb;28(1):e24-e29. doi: 10.1097/SLE.0000000000000492. Percutaneous Image-guided Surgery Training: Model IHU-DAICIM. Gimenez ME, Davrieux CF, Serra E, Palermo M, Houghton EJ, Acquafresca P, Dallemagne B, Kwak JM, Gonzalez CA, Marescaux .	2018	Abdominal	Endoscopic surgery	South America	porcine
Surg Innov. 2019 Dec;26(6):738-743. doi: 10.1177/1553350619881068. Epub 2019 Oct 11. Development and Preliminary Validation of a Rabbit Model of Duodenal Atresia for Training in Pediatric Surgical Skills. Ordorica-Flores R, Orpinel-Armendariz E, Rodríguez-Reyna R, Pérez-Escamirosa F, Castro-Luna R, Minor-Martínez A, Nieto-Zermeño J.	2019	abdominal	Laparoscopic surgery	South America	lapine (rabbit)
J Reconstr Microsurg. 2019 Sep;35(7):499-504. doi: 10.1055/s-0039-1679957. Epub 2019 Mar 5. A Novel Rat Model for Comprehensive Microvascular Training of End-to-End, End-to-Side, and Side-to-Side Anastomoses. Yin X, Ye G, Lu J, Wang L, Qi P, Wang H, Wang J, Hu S, Yang X, Chen K, Wang D.	2019	Trauma & Reconstructive	Microsurgery	Asia	murine (rat)
Innovations (Phila). 2019 Feb;14(1):37-42. doi: 10.1177/1556984519828016. Epub 2019 Feb 15. Optimizing Surgical Skills in Cardiac Surgery Residents with Cardiac Transplant in the High-Fidelity Porcine Model. Spooner AJ, Faulkner CM, Novick RJ, Kent WDT.	2019	Cardiothoracic	Microsurgery	North America	porcine
Ear Nose Throat J. 2019 Aug;98(7):E87-E91. doi: 10.1177/0145561319840835. Epub 2019 Apr 11. Training Residents to Perform Tracheotomy Using a Live Swine Model. Cheng PC, Cho TY, Hsu WL, Lo WC, Wang CT, Cheng PW, Liao LJ.	2019	Trauma & Reconstructive	Open surgery	Asia	porcine
Int Urogynecol J. 2019 Aug;30(8):1371-1375. doi: 10.1007/s00192-019-03936-7. Epub 2019 May 4. A live porcine model for robotic sacrocolpopexy training.	2019	Urology	Robotic surgery	North America	porcine
Laryngoscope. 2019 Sep 30. doi: 10.1002/lary.28309. [Epub ahead of print] Live porcine model for surgical training in tracheostomy and open-airway surgery.	2019	Trauma & Reconstructive	Endoscopic surgery	North America	porcine
J Invest Surg. 2019 Oct 6:1-8. doi: 10.1080/08941939.2019.1663376. [Epub ahead of print] Establishment of a Canine Training Model for Digestive Tract Reconstruction after Pancreaticoduodenectomy.	2019	Abdominal	Open surgery	Asia	misc

J Robot Surg. 2019 Nov 18. doi: 10.1007/s11701-019-01036-8. [Epub ahead of print] Simulated management of inferior vena cava injury during robotic paraaortic lymphadenectomy utilizing the porcine model.	2019	Abdominal	Robotic surgery	North America	porcine
Injury. 2020 Feb 11. pii: S0020-1383(20)30080-2. doi: 10.1016/j.injury.2020.02.006. [Epub ahead of print] A sequence of flaps and dissection exercises in the living model to improve the learning curve for perforator flap surgery.	2020	Trauma & Reconstructive	Microsurgery	Europe	porcine
J Hand Surg Am. 2020 Mar 31. pii: S0363-5023(20)30077-0. doi: 10.1016/j.jhsa.2020.02.001. [Epub ahead of print] The Turkey Digit: A New Training Model for Digit Replantation.	2020	Trauma & Reconstructive	Microsurgery	North America	misc
Surg Innov. 2019 Dec;26(6):738-743. doi: 10.1177/1553350619881068. Epub 2019 Oct 11. Development and Preliminary Validation of a Rabbit Model of Duodenal Atresia for Training in Pediatric Surgical Skills. Ordorica-Flores R, Orpinel-Armendariz E, Rodríguez-Reyna R, Pérez-Escamirosa F, Castro-Luna R, Minor-Martínez A, Nieto-Zermeño.	2019	abdominal	Laparoscopic surgery	South America	lapine (rabbit)

S2: Excluded studies

We excluded a total of 51 studies after review of the full-text articles. The reasons for exclusion from further analyses were:

- Review paper
- Ex-vivo model of surgical training
- No animal model described
- No details on the model used
- Perspective or Opinion article
- Similar model published by same authors
- No training models described
- Veterinary training

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Virtual training vs Animal model; Animal Model IMMER überlegen

Animal model beschrieben dass für Training entwickelt wurde

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S3: Search strategy

Database: PubMed, Google Scholar, Web of Science core collection and Scopus. Date of the last search: March 31st, 2020

1. Surgery training
2. Surgical training
3. Animal model "[MeSH Terms]
4. Animal training
5. training model
6. animal*
7. in-vivo model
8. #1 -2 OR
9. #3-7 OR
10. NOT ex-vivo
11. NOT exvivo
12. NOT review
13. NOT literature analysis
14. NOT perspective
15. #12-14 OR