

Stanford



Carla Pugh, MD, PhD

Professor of Surgery (General Surgery)

Surgery - General Surgery

 Curriculum Vitae available Online

CLINICAL OFFICES

- **Trauma Services**

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ACADEMIC CONTACT INFORMATION

- **Alternate Contact**

Cassidi Goll - Administrative Coordinator for the Technology Enabled Clinical Improvement Center

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Bio

BIO

Carla Pugh is Professor of Surgery at Stanford University School of Medicine. She is also the Director of the Technology Enabled Clinical Improvement (T.E.C.I.) Center. Her clinical area of expertise is Acute Care Surgery. Dr. Pugh obtained her undergraduate degree at U.C. Berkeley in Neurobiology and her medical degree at Howard University School of Medicine. Upon completion of her surgical training at Howard University Hospital, she went to Stanford University and obtained a PhD in Education. She is the first surgeon in the United States to obtain a PhD in Education. Her goal is to use technology to change the face of medical and surgical education.

Her research involves the use of simulation and advanced engineering technologies to develop new approaches for assessing and defining competency in clinical procedural skills. Dr. Pugh holds three patents on the use of sensor and data acquisition technology to measure and characterize hands-on clinical skills. Currently, over two hundred medical and nursing schools are using one of her sensor enabled training tools for their students and trainees. Her work has received numerous awards from medical and engineering organizations. In 2011 Dr. Pugh received the Presidential Early Career Award for Scientists and Engineers from President Barak Obama at the White House. She is considered to be a lead, international expert on the use of sensors and motion tracking technology for performance measurement. In 2014 she was invited to give a TEDMED talk on the potential uses of technology to transform how we measure clinical skills in medicine. In April 2018, Dr. Pugh was inducted into the American Institute for Medical and Biological Engineering.

CLINICAL FOCUS

- General Surgery

ACADEMIC APPOINTMENTS

- Professor, Surgery - General Surgery
- Member, Stanford Cancer Institute

PROFESSIONAL EDUCATION

- Fellowship: University of Michigan Medical School (2009) MI

- PhD, Stanford University Graduate School of Education , Education & Technology (2001)
- Board Certification: General Surgery, American Board of Surgery (1999)
- Residency: Howard University Hospital General Surgery Residency (1997) DC
- Medical Education: Howard University College of Medicine (1992) DC

LINKS

- Getting a Sense for the Surgical Touch: <https://www.youtube.com/watch?v=k9D-vxGkHTc>
- LinkedIn: <https://www.linkedin.com/in/carla-pugh-2ab0b511b/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

The Technology Enabled Clinical Improvement (T.E.C.I.) Center is a multidisciplinary team of researchers dedicated to the design and implementation of advanced engineering technologies that facilitate data acquisition relating to clinical performance.

The T.E.C.I. team has had great success in quantifying physicians' clinical experiences using sensor, video, and motion tracking technologies. This work has resulted in an information rich database that enables empirical evaluation of clinical excellence and medical decision making.

By leveraging highly specific and objective clinical performance metrics, the T.E.C.I. Center is harnessing the unique opportunity to support peer to peer data sharing and clinical collaborations that can transform the clinical workflow and ultimately benefit healthcare providers.

The T.E.C.I. Center aims to transform human health and welfare through advances in data science and personalized, technology-based performance metrics for healthcare providers.

Publications

PUBLICATIONS

- **Shortcut assessment: Can residents' operative performance be determined in the first five minutes of an operative task?** *Surgery*
Mohamadipanah, H., Nathwani, J., Peterson, K., Forsyth, K., Maulson, L., DiMarco, S., Pugh, C.
2018; 163 (6): 1207–12
- **Screening surgical residents' laparoscopic skills using virtual reality tasks: Who needs more time in the sim lab?** *Surgery*
Mohamadipanah, H., Perrone, K. H., Nathwani, J., Parthiban, C., Peterson, K., Wise, B., Garren, A., Pugh, C.
2019
- **Advanced Volumetric 3-Dimensional Visualization of Surgical Anatomy-Are We There Yet?** *JAMA surgery*
Pugh, C. M.
2019
- **In Search of Characterizing Surgical Skill.** *Journal of surgical education*
Azari, D., Greenberg, C., Pugh, C., Wiegmann, D., Radwin, R.
2019
- **Teaching practicing surgeons what not to do: An analysis of instruction fluidity during a simulation-based continuing medical education course.** *Surgery*
Godfrey, M., Rosser, A. A., Pugh, C. M., Shaffer, D. W., Sachdeva, A. K., Jung, S. A.
2019
- **Electronic health records, physician workflows and system change: defining a pathway to better healthcare** *ANNALS OF TRANSLATIONAL MEDICINE*
Pugh, C. M.
2019; 7

- **Electronic health records, physician workflows and system change: defining a pathway to better healthcare.** *Annals of translational medicine*
Pugh, C. M.
2019; 7 (Suppl 1): S27
- **Combining metrics from clinical simulators and sensorimotor tasks can reveal the training background of surgeons.** *IEEE transactions on bio-medical engineering*
Huang, F. C., Mohamadipannah, H., Mussa-Ivaldi, F., Pugh, C.
2019
- **Dynamic Visual Feedback During Junctional Tourniquet Training.** *The Journal of surgical research*
Xu, J., Kwan, C., Sunkara, A., Mohamadipannah, H., Bell, K., Tizale, M., Pugh, C. M.
2019; 233: 444–52
- **What do you want to know? Operative experience predicts the type of questions practicing surgeons ask during a CME laparoscopic hernia repair course.** *American journal of surgery*
Godfrey, M., Rosser, A. A., Pugh, C. M., Sachdeva, A. K., Sullivan, S.
2018
- **Surgical procedural map scoring for decision-making in laparoscopic cholecystectomy.** *American journal of surgery*
Hashimoto, D. A., Axelsson, C. G., Jones, C. B., Phitayakorn, R., Petrusa, E., McKinley, S. K., Gee, D., Pugh, C.
2018
- **Faculty perceptions of resident skills decay during dedicated research fellowships** *AMERICAN JOURNAL OF SURGERY*
D'Angelo, A. D., D'Angelo, J. D., Rogers, D. A., Pugh, C. M.
2018; 215 (2): 336–40
- **A structured, extended training program to facilitate adoption of new techniques for practicing surgeons**
Greenberg, J. A., Jolles, S., Sullivan, S., Quamme, S., Funk, L. M., Lidor, A. O., Greenberg, C., Pugh, C. M.
SPRINGER.2018: 217–24
- **Residents' response to bleeding during a simulated robotic surgery task** *JOURNAL OF SURGICAL RESEARCH*
Walker, J. L., Nathwani, J. N., Mohamadipannah, H., Laufer, S., Jocewicz, F. F., Gwillim, E., Pugh, C. M.
2017; 220: 385–90
- **A Holistic Model of Surgical Expertise and Competency** *ANNALS OF SURGERY*
Pugh, C. M.
2017; 265 (2): 268–69
- **Sensor technology in assessments of clinical skill.** *The New England journal of medicine*
Laufer, S., Cohen, E. R., Kwan, C., D'Angelo, A. D., Yudkowsky, R., Boulet, J. R., McGaghie, W. C., Pugh, C. M.
2015; 372 (8): 784–86
- **Characterizing Touch Using Pressure Data and Auto Regressive Models**
Laufer, S., Pugh, C. M., Van Veen, B. D., IEEE
IEEE.2014: 1839–42
- **Intra-operative decision making: More than meets the eye** *JOURNAL OF BIOMEDICAL INFORMATICS*
Pugh, C. M., Santacaterina, S., DaRosa, D. A., Clark, R. E.
2011; 44 (3): 486–96
- **Development and validation of assessment measures for a newly developed physical examination simulator** *JOURNAL OF THE AMERICAN MEDICAL INFORMATICS ASSOCIATION*
Pugh, C. M., Youngblood, P.
2002; 9 (5): 448-460
- **Qualitative and quantitative analysis of pressure sensor data acquired by the E-Pelvis simulator during simulated pelvic examinations.** *Studies in health technology and informatics*
Pugh, C. M., Rosen, J.
2002; 85: 376–79

- **Visual representations of physical abilities: Reverse haptic technology?** *10th Annual Medicine Meets Virtual Reality Conference*
Pugh, C. M., Srivastava, S., Heinrichs, M. L.
I O S PRESS.2002: 380–381