

Sepsis is the leading cause of death in US hospitals and kills over 26 million people worldwide each year. Mortality from sepsis increases 8% for every hour that treatment is delayed and as many as 80% of sepsis deaths could be prevented with rapid diagnosis and treatment. Dr. Cull is working with Dr. Xiao to test a micro pH probe that could serve as early detector of sepsis, hopefully saving many lives

Dr. Cull is also working with Dr. Robert Riggs on how to best triage patients. The purpose of triage is to ration effectively patient treatments when resources are insufficient for all patients to be treated immediately. Certain patients (geriatric patients and patients with gunshot or stab wounds) are often more difficult to assess and have higher errors in triage. Correct triage is important in these populations in order not to overburden current trauma systems due to the aging population or in times of mass casualty.

Dr. Cull is working with Dr. D Hudson Smith to use machine learning to determine how much fluid to give to critically ill patients. If too little fluid is given, then patients are not able to supply blood and oxygen to their tissues. If physicians give too much fluid, patients will develop pulmonary edema and possibly develop heart failure. Dr. Cull and Dr. D Hudson Smith are attempting to use machine learning to learn when to appropriately give fluid to critically ill patients.

5. Key health research interest areas: (keywords)

Including relevant key words will facilitate the search on the CUSHR web site by those interested in particular types of research. Please include at least 5 key words and as many additional words that you feel are appropriate.

Sepsis, machine learning, teamwork, shock, fluid management, critical care, trauma

6. News and media related to your research (this may duplicate what is on your CV)

By highlighting what you consider to be the important news and media releases that are related to your research, CUSHR can facilitate cross referencing from the CUSHR site to these particular sites related to you, that you are interested in having others read.

None

7. Current curriculum vitae

This is the most important document that needs to be submitted to the CUSHR appointment committee. The committee will use your most recent curriculum vitae to both establish your eligibility for appointment as CUSHR Clinical Faculty and to determine the faculty rank that will be offered to you. **Please note:** CV's of CUSHR clinical faculty are posted as part of the online Clinical Faculty profiles, please be sure that no private information (such as SSN number, etc.) is included.

AWARDS AND HONORS

University

2004 Cum Laude Graduate
Wake Forest University

2013 AAST Medical Student/Resident Scholarship
The American Association for the Surgery of Trauma

2013 Finalist in Annual Resident Trauma Paper Competition
Chicago Committee on Trauma

2013 Surgical Sciences Research Award Finalist
Rush University Medical Center

2014 Poster of Distinction
World Transplant Congress
Insurance Statue of Cadaveric Organ Donors

Local

SERVICE, GHS

August 2016 Stellar Star August, 2016
Greenville Health System

TEACHING

2005 Best Teacher Award
Kaplan Center

INTELLECTUAL PROPERTY

Patent Negative Pressure Wound Therapy Removal Device Issue Date

MEMBERSHIPS IN HONORARY AND PROFESSIONAL SOCIETIES

2013-Present Eastern Association for the Surgery of Trauma
Member

2015-Present Society of Critical Care Medicine
Member

08/2015-2017 American College of Surgeons
Associate Fellow

2016-Present American Hernia Society
Member

2016-Present Southeastern Surgical Congress
Member

2017-Present American College of Surgeons
Fellow

RESEARCH GRANTS, CONTRACTS AND PROJECTS

PRIOR NON-PEER-REVIEWED

Title: Gift of Hope Grant Program
Source:
Role: Principal Investigator
Dates: 2013 – Present

Direct Funds: \$30000

Title: Gift of Hope Grant Program

Source:

Role: Principal Investigator

Dates: 2014 – Present

Direct Funds: \$50000.00

PEER-REVIEWED LECTURES AND PRESENTATIONS GIVEN

International

Carsten III, C. G., Cull, J. D., Cull, D. L., Taylor, S. M., Snyder, B. A., Youkey, J. R., Langan III, E. M., Blackhurst, D. W., "Prosthetic Thigh Arteriovenous Access: A Reappraisal of Outcome Using the ASVS/AAVS Reporting Standards for Arteriovenous Access," Society for Vascular Surgery/American Association for Vascular Surgery, Toronto, Ontario, Canada. (June 8, 2003 - June 11, 2003).

National

Cull, J. D., Cull, D. L., Taylor, S. M., Youkey, J. R., Snyder, B. A., Langan, E. M., Blackhurst, D. W., "Prosthetic Thigh Arteriovenous Access: Outcome Using the SVS/AAVS Reporting Standards," SVS/AAVS Annual Meeting, SVS/AAVS, Chicago, IL. (June 8, 2003).

Cull, J. D., Kukreja, S., Hieken, T. J., "Surgical Treatment of Colorectal Cancer in the Advanced Elderly: Does Outcome justify treatment?," 2011 ANNUAL MEETING, American Society of Clinical Oncology, Chicago, IL. (June 2011).

CULL, J., VELASCO, J., "Trends in the Management of Acute Cholecystitis: Prevalence of Percutaneous Cholecystostomy and Delayed Cholecystomy in an Elderly Population," DDW Annual Meeting, DDW, Orlando, FL. (May 2013).

Cull, J. D., SAKAI, L. M., SABIR, I., JOHNSON, B., TULLY, A., NAGY, K., DENNIS, A., STARR, F. L., JOSEPH, K., WILEY, D., MOORE, H., OLIPHANT, U. J., "Outcomes in Traumatic Brain Injury for Patients Presenting on Antiplatelet Therapy," AAST Annual Meeting, San Francisco, CA. (September 2013).

Cull, J. D., Spivey, T., Kingsley, S., Chan, E., "Insurance Status of Cadaveric Organ Donors," World Transplant Congress, World Transplant Congress, San Francisco, CA. (July 2014).

Cull, J. D., Spivey, T., Ansell, D. A., Kingsley, S., Joseph, K., Chan, E. Y., "Insurance Status of Cadaveric Organ donors," 25th Annual Scientific Assembly of the Society of Black Academic surgeons, World Transplant Congress, Chapel Hill, NC. (April 2015).

Cull, J. D. (Author), Manning, B. (Author), Fleetwood, V. (Author), Spivey, T. (Author), Chan, E. (Author), "Impact of Health-Care Worker Attitudes Toward Organ Donation," Southeastern Surgical congress 2016 Annual Scientific Meeting, SESC (Southeastern Surgical Congress), Atlanta, GA. (February 20, 2016 - February 23, 2016).

Cull, J. D., Ivkovic, K., Chan, E. Y., "Trauma Patients' Attitudes Toward Organ Donation at an Urban Level I Trauma Center," American College of Surgeons Clinical Congress, American College of Surgeons, Washington, DC. (October 16, 2016 - October 20, 2016).

Cull, J. D., "The Disparity Between Organ Donation and Allocation: Has the Affordable Care Act Made a Difference?," American College of Surgeons Clinical Congress, American College of Surgeons, San Diego, CA. (October 21, 2017 - October 26, 2017).

Cull, J. D., "The Disparity Between Organ Donation and Allocation: Has the Affordable Care Act Made a Difference?," American College of Surgeons Clinical Congress, American College of Surgeons, San Diego, CA. (October 21, 2017 - October 26, 2017).

Riggs, R. J., Riggs, S., Byham, M., Baugh, N., Witherspoon, M., Cull, J. D., Manning, B., "Development of Trauma Level Prediction Models Utilizing EMS Vital Signs to Reduce Over-and Undertriage Rates in Penetrating Wounds and in Elderly Falls," AAST Annual Meeting, San Diego, CA. (September 2018).

Regional

Cull, J. D., Spivey, T. L., Fleetwood, V. A., Manning, B., Chan, E. Y., "Health-Care Worker Attitudes Toward Organ Donation at Two Level I Urban Trauma Centers," Southeastern Surgical Congress 2017 Annual Meeting, Southeastern Surgical Congress, Nashville, TN. (February 25, 2017 - February 28, 2017).

Goff, T., Cull, J. D., "Intraoperative communication and the effect of navigational grids during laparoscopic cholecystectomies," Southeastern Surgical Congress 2017 Annual Meeting, Southeastern Surgical Congress, Nashville, TN. (February 25, 2017 - February 28, 2017).

Schneider, A. (Author), Manning, B. (Author), Ben-Or, S. (Author), Cull, J. D., Bolton, W. (Author), "A Rare Cause of Pneumopericardium in a Patient Following a Motor Vehicle Collision," Southeastern Surgical Congress 2017 Annual Scientific Meeting, SESC (Southeastern Surgical Congress), Nashville, TN. (February 25, 2017 - February 28, 2017).

NON-PEER-PEER-REVIEWED LECTURES AND PRESENTATIONS GIVEN

Local

Bartz, M., Cull, J. D., "Elderly Fall From Standing: The New Trauma Epidemic," J.D. Ashmore Lectureship, Greenville Health System Department of Surgery, Greenville, SC. (June 9, 2017).

Berglind, W., Cull, J. D., "The Open Abdomen: A Review of Our Institution's Experience," J.D. Ashmore Lectureship, Greenville Health System Department of Surgery, Greenville, SC. (June 9, 2017).

Cull, J. D., "Should Elderly/Comorbid Patients Be Managed More or Less Aggressively Than Their Younger, Healthier Counterparts?," J.D. Ashmore Lectureship, Greenville Health System Department of Surgery, Greenville, SC. (June 15, 2018).

COMMITTEE SERVICE

Department Service

2017-Present Medical Student Coordinator, Acute Care AI medical student coordinator
2017-Present Medical Student Coordinator, Trauma AI medical student coordinator
2018-Present Program Director Surgical Critical Care Fellowship, GHS Department of Surgery
2018-Present Co-Medical Director Medicine/Surgery ICU

Greenville Health System Service

2015-Present Attendee, Meeting, Mortality Review Committee
This committee reviews cases of in hospital mortalities at GHS. We each review cases and meet every two weeks for 1 hour to discuss opportunities for improvement. Data is collected to identify global areas for improvement.
2016-Present Attendee, Meeting, SAFE Care Committee
Meets Monthly for 1 hour to discuss GHS performance on national quality indicators and ways to improve safety at GHS
2018-Present Attendee, Meeting, Antibiotic Stewardship Committee
Meets quarterly

Professional Service

2017-Present Committee Member, Multicenter Trials Committee, Eastern Association for The Surgery of Trauma

CURRENT & PREVIOUS TEACHING AT OTHER INSTITUTIONS

UNDERGRADUATE EDUCATION

2017-Present Instructor, Research, Clemson University.

PROGRAM DEVELOPMENT CERTIFICATION

2016-Present	Advanced Trauma Operative Management (ATOM) Instructor Sponsored By American College of Surgeons.
2016-Present	Advanced Trauma life Support (ATLS) Instructor Sponsored By American College of Surgeons.
2017-Present	Advanced Surgical Skills for Exposure in Trauma (ASSET) Instructor Sponsored By American College of Surgeons.

BIBLIOGRAPHY

REFEREED JOURNAL PUBLICATIONS AND ORIGINAL PAPERS

1. Cull JD, Cull D, Taylor S, Carsten, 3rd CG, Snyder B, Youkey JR, et al. Prosthetic thigh arteriovenous access: outcome with SVS/AAVS reporting standards. *Journal of vascular surgery*. 2004 Feb 1;39(2):381–6. PMID: 14743140
2. Cull JD, Bokhari F. Penetrating chest injury in the setting of a hemothorax: should pericardial windows replace echocardiograms? *The American surgeon*. 2013 Feb 1;79(2):E56–7. PMID: 23336631
3. Cull JD, Velasco JM, Czubak A, Rice D, Brown EC. Management of acute cholecystitis: prevalence of percutaneous cholecystostomy and delayed cholecystectomy in the elderly. *Journal of gastrointestinal surgery : official journal of the Society for Surgery of the Alimentary Tract*. 2014 Feb 1;18(2):328–33. PMID: 24197550
4. Cull JD, Sakai LM, Sabir I, Johnson B, Tully A, Nagy K, et al. Outcomes in traumatic brain injury for patients presenting on antiplatelet therapy. *The American surgeon*. 2015 Feb 1;81(2):128–32. PMID: 25642873
5. Cull JD, Spivey TL, Fleetwood VA, Manning B, Chan EY. Impact of Health-Care Worker Attitudes Toward Organ Donation. *The American surgeon*. 2016 Sep 1;82(9):242–4. PMID: 27670534
6. Cull JD, Spivey TL, Kingsley S, Ansell DA, Joseph K, Chan E. Insurance Status of Deceased Organ Donors. *GHS Proceedings*. 2016 Nov;1(2):126–9.
7. Zielinski MD, Haddad NN, Cullinane DC, Inaba K, Yeh DD, Wydo S, et al. Multi-institutional, prospective, observational study comparing the Gastrografin challenge versus standard treatment in adhesive small bowel obstruction. *The journal of trauma and acute care surgery*. 2017 Jul 1;83(1):47–54. PMID: 28422909
8. Cull JD, Fleetwood VA, Manning B, Chan EY. Healthcare Workers' Attitude toward Organ Donation at Two Level 1 Urban Trauma. *The American surgeon*. 2017 Sep 1;83(9):389–91. PMID: 28958262
9. Hernandez MC, Haddad NN, Cullinane DC, Yeh DD, Wydo S, Inaba K, et al. The American Association for the Surgery of Trauma Severity Grade is valid and generalizable in adhesive small bowel obstruction. *The journal of trauma and acute care surgery*. 2018 Feb 1;84(2):372–8. PMID: 29117026
10. Goff T, Cull JD. Improved Intraoperative Communication after Utilization of Navigational Grids during Laparoscopic Cholecystectomies. *The American surgeon*. 2018 May 1;84(5):727–31. PMID: 29966575
11. Cull JD, Mayberry WE, Firestone A, Cardin-Pozo S, Van Wert M, Entriken C, et al. Predictive Value of the Initial Trauma Survey: Is Our Hunch Good Enough? *Am Surg*. 2018 Aug 1;84(8):e282–e284.

12. Cull JD, Ivkovic K, Manning B, Chan EY. Trauma Patients' Attitudes Toward Organ Donation at an Urban Level I Trauma Center. *Am Surg*. 2018 Sep 1;84(9):1493-1498.

BOOK CHAPTERS

1. Cull JD, Heiden KB. Incidentaloma. In: *Common Surgical Diseases: An Algorithmic Approach to Problem Solving*. Chicago, IL/Springer; 2015.

REFEREED ABSTRACTS

1. Riggs R, Riggs S, Byham M, Witherspoon M, Baugh N, Metcalf A, et al. Development of Trauma Level Prediction Models Utilizing EMS Vital Signs to Reduce Over and Under Triage Rates for Penetrating Wounds and Elderly Falls.

SCHOLARLY RESEARCH

1. Fast and Early Detection of Sepsis/Hemorrhagic Shock Using Micro pH Probes, On-Going. Cull, John D., Xiao, Hai. (2017 - Present).
Clemson has developed a microprobe that can directly measure the pH level of the muscle or peripheral tissues [4-8]. The hypothesis is that the pH level in the peripheral tissues can directly provide the information of impaired tissue oxygenation and be used as an early detection of sepsis. We will use cecal ligation and perforation in a rat as our model for sepsis. Ten rats will be anesthetized and a cecal ligation and perforation will be performed. The pH probes will then be placed in peripheral muscles to undergo continuous pH monitoring. We will measure serial pH and LA levels for 24 hours. 10 rats will be used in this study and the data will be analyzed in a statistic model to find the clinical relevance.
2. Incidence of Post Extubation Stridor in Patients who had undergone Intermittent vs Continuous Suctioning on Endotracheal Tubes with Subglottic Suction Lines, On-Going. Cull, John D. (2017 - Present).
Working with 4th year Clemson Student who is applying to medical school. We noticed that there is a high incidence of post extubation stridor in patients who have endotracheal tubes with subglottic suction lines. A hospital wide policy changed in February 2016. Endotracheal Tubes are now undergoing intermittent as opposed to continuous suctioning.
3. Prospective Database to Study Management of Open Abdomens, On-Going. Cull, John D., Cholte, Jeff. (2017 - Present).
Developed an open abdomen protocol and a Red Cap Database to prospectively review treatment of open abdomens managed by the Green Team. Working Jeff Cholte (medical student).
4. Utilizing Different Modes of Transport for Trauma Patients, Planning. Cull, John D., Schneider, Andrew. (2017 - Present).
To develop criteria to be used in mode selection decisions for trauma patients. GMH is a level 1 trauma center. Most of the time patients are transported by ambulance to the center. However, when patients are "critically sick" and "sufficiently far" from the hospital, they are flown by helicopter. Unfortunately, there are no existing criteria to help the GMH decision makers to determine what "critically sick" and "sufficiently far" mean. Our research team will develop such criteria to help in these mode selection decisions. Awaiting Addresses from DHEC. Andrew Schneider working on the project with me.
5. Creation of Next-generation Screening, Assessment and Training Tools for Surgical Skills, On-Going. Cull, John D., Singapogu, Joseph Ravi. (2018 - Present).
Collaborating with Joseph Ravi Singapogu on improving screening, assessment and training tools for surgical education.
6. Evaluating a Sepsis Predictive Analytic Tool, On-Going. Cull, John D. (2018 - Present).
Epic has developed a sepsis predictive analytic tool. Currently this new analytic tool is undergoing internal validation before it becomes available to all physicians at GHS. This sepsis predictive tool will provide a sepsis score for all hospitalized patients beginning in September. The purpose of this

research is to publish the evaluation of this epic sepsis analytic tool from the data we have collected from January 2018-August 2018.

7. Evaluation of Palliative Care for Non-Healing Wounds, On-Going. Cull, John D., Rogers, Chelsea, Bonnett, A. (2018 - Present).
Worked with a college student Chelsea Rogers who was a summer research intern. The purpose of this study is to determine the patients and types of wounds that are chronic, non-healing wounds (>1yr) in an effort to predict risk factors and provide more cost-effective care. We have queried Wound Expert database for all patients who received wound care treatment between January 1, 2010 and December 31, 2015. Found 77 patients with nonhealing wounds and have data collection including MRN, patient demographics (age, gender, race) and comorbidities (diabetes, BMI, etc), type of wound, location of wound, date of initial treatment, date of final treatment/wound healed, type of wound treatment(s), additional infections, and medications. Now going back through the data to review number of hospitalizations related to the wound, number of clinic visits, median pain score, and surgical interventions. Working with Bonnett
8. Infections in the Traumatic Open Abdomen: IRB pending, On-Going. Cull, John D., Hutchenson, Robert. (2018 - Present).
I am reviewing our open abdomens and see how we close and determine our infection rates. Working with Robert Hutchenson (medical student)
9. Moral Distress of Nurses in the CVICU, On-Going. Cull, John D., Shuffler, Marissa. (2018 - Present).
The research aim of this study is to describe the extent of moral distress in nurses and surgeons who work and practice in the adult critical care units. This is a two phase study 1) first phase will implement a brief screening tool to measure moral distress to determine the initial level of perceptions of moral distress. 2) Phase two will be implemented after analysis of findings of phase one and after any urgent interventions implemented, thus, after a period of time, a more extensive survey will be deployed, the Moral Distress for Health Professionals survey, with specific questions involving clinical situations to determine the extent and frequency of moral distress. This two phased approach will provide for initial screening, time for follow up and then ability to further define what specific situations may require more intense appropriate interventions. Collaborating with nursing and Marissa Shuffler at Clemson.
10. Multi-Center Data Sharing Study on New Ways of Defining Over/Undertriage and Major Trauma, On-Going. Cull, John D. (2018 - Present).
Baylor is primary center along with 20 other centers. Two papers have been accepted for podium presentation at AAST.
11. National Rib Fracture Study, On-Going. Cull, John D. (2018 - Present).
This is a follow up study from the review of our literature finding that rib fractures are not as morbid as we once thought. I will query the NTDB.
12. Outcomes of Patients with Traumatic Brain Injury on Novel Antiplatelet Therapy, On-Going. Cull, John D. (2018 - Present).
Prospectively acquiring data on all trauma patients on antiplatelet therapy. Primary endpoints are mortality, neurosurgical intervention, intracranial hemorrhage and worsening bleed. Secondary outcome is length of stay. Will compare control, antiplatelet therapy and novel antiplatelet therapy groups. Will obtain data on patients receiving platelets, P2Y12 levels, Hx of stent, liver disease, CHF, kidney disease, HIV/AIDS, Hx of Stroke, DM, PVD, INR. We have been collecting this data for approximately 1 year. Will likely need to collect for 5 years. Will evaluate every year.
13. Segmentation and Machine Learning to Grade Image Quality Performed on Focused Assessment With Sonography for Trauma Examinations, On-Going. Cull, John D., Smith, D Hudson, Morrow, Dustin. (2018 - Present).
We perform thousands of FAST exams per year at Greenville Memorial Hospital. Currently, a sampling of these images must be reviewed and graded by physicians to ensure quality and for credentialing. The purpose of this study is to upload the ultrasound images to Watson (a supercomputer at Clemson)

in attempts to train the computer to accurately evaluate these images for quality. Collaborating with D. Hudson Smith and Dustin Morrow (in ED)

14. Teamwork and ICU design to improve outcomes, On-Going. Cull, John D., O'Hara, Susan. (2018 - Present).

The goal of designing an intensive care unit is to create spaces with good visibility, openness, and connectivity in order to improve patient care outcomes. These characteristics have been found to promote healthcare teams to think and adapt better to complex situations. Due to budgetary and space constraints, many ICUs are not optimally designed. However, healthcare workers have learned to adapt to their ICU space to create different "neighborhoods" within the ICU. Neighborhoods are comprised of 'corners' where teams meet and exchange information. These "neighborhoods" have the greatest visibility between nurses' stations and from nurse's stations to patients' rooms. We are looking at how the design of ICUs affect teamwork and how to improve teamwork within established design. Collaborating with Susan O'Hara

15. Using Machine Learning To Determine Fluid Responsiveness in Trauma ICU patients, On-Going. Cull, John D., Smith, D Hudson. (2018 - Present).

A pilot study where variables will be recorded before a fluid bolus. The trauma and surgical ICUs will be surveyed from Monday to Friday from 7:00 AM to 4:00 PM. Patients receiving crystalloid ≥ 500 mL or colloid (100 ml, 25% or 500 mL, 5%) will be identified. An Echo will be performed before the fluid bolus and then directly after the fluid bolus. A physician will record clinical data including demographic (age, sex, admission diagnosis) and clinical information (body surface area, mean arterial blood pressure, heart rate, 24-hour fluid balance, ventilator settings and surgeries performed before the pre-TTE, IJ, IVC, carotid flow, systolic blood pressure variation, passive leg raise, BUN, creatinine, FENa, Total I/Os, dry weight, pH, base deficit, lactic acid, CVP, PCWP, passive leg raise). Collaborating with D. Hudson Smith.

16. Utilizing Live Video During Trauma Activations to Improve Quality and Education, On-Going. Cull, John D. (2018 - Present).

We have new trauma monitors in the trauma bay. Working on getting adequate audio. Created an objection evaluation form based upon a published score sheet used to evaluate simulated traumas. Will score resident run traumas using this objective scoring measure. We will then review the traumas with the residents and determine if the scores improve after the education session. Issue with lawyers.