

How to Save a Life: An Introduction to Emergency Medicine

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Faculty Sponsor: George Grody / MMS / [email address]

Fall 2022

Meeting Time: To Be Determined
Meeting Location: To Be Determined

Course Description:

A house course dedicated to developing an in-depth understanding of the management of medical emergencies. Taught by members of Duke University EMS, students will gain an introduction to emergency medicine with applications to real world situations, particularly within the Duke and Durham community. Covered topics include how to react if someone goes into cardiac arrest, how to help choking victims, how to care for burns, how to bandage wounds, how to splint injuries, and much more. Beyond that, the course will delve into modern advancements in emergency medicine, as well as many of the issues which medics and emergency department physicians still face today.

No prior medical experience is necessary, but the course aims to provide valuable medical knowledge. Skills will be taught, but a large emphasis will be placed on the importance of emergency interventions and how improvements can/have been made to emergency medical systems. Students will also be introduced to more ways they can become involved with emergency medicine in the Duke and Durham community if they choose to pursue them.

Objectives:

- Understand the basic breakdown of emergency medical services in Duke/Durham and on a national scale, how these services operate, and how to get involved.
- Ability to perform basic life-saving and first aid skills for bystanders, including (but not limited to) CPR and AED skills, Heimlich maneuver, wound and burn care, splinting, and shock recognition.
- Understand new developments in emergency medicine, both in the field and in hospital emergency rooms.

Required Texts:

All readings will be available online.

Course Requirements:

- 1) House courses are graded on the S/U basis. A grade of satisfactory in this course requires satisfactory completion of all assignments of this course including written and oral assignments, attendance, participation, and involvement in activities.
- 2) Completion of a final scholarly paper of at least 5 pages double spaced on the topic of the student's choosing within the field of emergency medicine (pertaining to class discussions). Final writing assignment expectations can be found below.

Writing Assignment

Students will be required to submit one scholarly paper at the end of the course that pertains to one of the medical emergencies discussed during the semester. The assigned prompt will read: "Select one of the medical emergencies discussed in the course and explain its prevalence, risk factors, pathophysiology, bystander treatments, prehospital EMS treatments, and ongoing research pertaining to the emergency. Potential topics include cardiac arrest, choking, shock, traumatic injuries, and diabetic emergencies." Papers must incorporate relevant data and medical information from a minimum of three (3) scholarly journals, cited appropriately. 1500 minimum word count."

Grading

A grade of satisfactory (S) in this course requires satisfactory completion of all assignments of this course including written and oral assignments, attendance, and completion of the final paper. Students must attend at least eleven (11) class sessions to satisfy the attendance requirement.

Course Schedule:

Week 1 Introduction to Emergency Medicine; Vital Signs

Activity/Discussion: Discussion of what sparked students' interest in emergency medicine. Brief overview of the course and class expectations, then discussion topics and skills students are most interested in learning about for the semester. Overview of the Emergency Medical System. Discussion of vital signs used by EMS personnel to evaluate patients: heart rate, breathing rate, blood pressure, body temperature, skin condition, pupil reactivity, capillary refill, oxygen saturation, capnography, blood pressure, 12-lead EKG. Practice evaluating vital signs.

Assignments: N/A

Readings (# pages): 62 Pages Total

Faculty Sponsor: Present

- What is EMS: A Definition (<https://www.ems1.com/careers/articles/what-is-ems-a-definition-k9NGuHjFExaERTzK/>) (2 Pages)
- What are vital signs? (<https://www.hopkinsmedicine.org/health/conditions-and-diseases/vital-signs-body-temperature-pulse-rate-respiration-rate-blood-pressure>) (5 pages)
- *The Bystander-Effect: A Meta-Analytic Review on Bystander Intervention in Dangerous and Non-Dangerous Emergencies* (<https://pdfs.semanticscholar.org/43e9/57f87e561c4d2d65715e6fe94e872b34299e.pdf>) (21 pages)
- CPR Survival Stories (<https://inpulsecpr.com/inpulse-cpr-blog/survival-stories>) (34 pages)

Optional Readings: 15 Pages Total

- *Association of National Initiatives to Improve Cardiac Arrest Management With Rates of Bystander Intervention and Patient Survival After Out-of-Hospital Cardiac Arrest* (<https://www.ncbi.nlm.nih.gov/pubmed/24084923>) (8 pages)
- *Analysis and results of prolonged resuscitation in cardiac arrest patients rescued by extracorporeal membrane oxygenation* (<https://www.ncbi.nlm.nih.gov/pubmed/12535808>) (7 pages)

Week 2 CPR and AED

Activity/Discussion: Hear a real story of successful CPR and defibrillation from a Duke Faculty member. Continue practicing skills required for CPR and AED use on adults, children, and infant. Learn the Heimlich maneuver. Introduce the merits of new technologies being used for cardiac arrest resuscitation by EMTs and paramedics (ie. LUCAS, King Airway, I-Gel), and their effectiveness for positive patient outcomes.

Assignments: Complete readings.

Readings (# pages): 52 Pages Total

Faculty Sponsor: Present

- Highlights of the 2019 American Heart Association Guidelines for CPR and ECC (https://eccguidelines.heart.org/wp-content/uploads/2019/11/2019-Focused-Updates_Highlights_EN.pdf) (36 pages)

- *Effectiveness of Emergency Response Planning for Sudden Cardiac Arrest in United States High Schools With Automated External Defibrillators* (<https://www.ncbi.nlm.nih.gov/pubmed/19635968>) (14 pages)

- *Predicting survival from out-of-hospital cardiac arrest: A graphic model* (<https://www.ncbi.nlm.nih.gov/pubmed/8214853>) (Read introduction and abstract: 2 pages)

Optional readings: 36 Pages Total

- *Intubation Success through I-Gel® and Intubating Laryngeal Mask Airway® Using Flexible Silicone Tubes: A Randomised Noninferiority Trial* (<https://www.hindawi.com/journals/arp/2016/7318595/>) (18 pages)
- *The Efficacy of LUCAS in Prehospital Cardiac Arrest Scenarios: A Crossover Mannequin Study* (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5391893/>) (18 pages)

Week 3 Airway Management / Respiratory Emergencies

Activity/Discussion: Students will discuss/learn about the human respiratory system and how it pertains to airway protection skills. Students will understand the different situational uses for various airway support tools and learn skills including head-tilt-chin-lift, jaw-thrust, rescue position, semi-fowler's position, intubations, King Airway positioning, oropharyngeal airway and nasopharyngeal airway insertion, proper bag valve mask use, etc.

Assignments: Complete readings.

Readings (# pages): 73 Pages Total + 15 Minute Video

Faculty Sponsor: Absent

- Airway Management Basics Video, 15 minutes.
<https://www.youtube.com/watch?v=WK9V1XUsw5A>
- *Advances in prehospital airway management* (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3982372/>) (12 pages)
- *Airway management in trauma* ([https://www.emed.theclinics.com/article/S0733-8627\(17\)30075-5/fulltext](https://www.emed.theclinics.com/article/S0733-8627(17)30075-5/fulltext)) (25 pages, skim)
- *Anatomy & Physiology Unit 5; Energy, Maintenance, and Environmental Exchange; Chapter 22. The Respiratory System* (<https://openstax.org/details/anatomy-and-physiology>) (36 pages)

Week 4 Shock and Bleeding

Activity/Discussion: Students will learn about the various types of shock, how to recognize them, and appropriate treatments for shock. They will discuss types of bleeding (including internal bleeding due to fractures or organ rupture/laceration), recognizing bleeding conditions, and bleeding control techniques.

Assignments: Complete Readings; begin thinking about final paper ideas.

Readings (# pages): 55 Pages Total

Faculty Sponsor: Absent

- *Bleeding and Shock* <http://emt-training.org/bleeding-shock.php> (4-52; 48 pages)
- Overview of Bleeding Control <https://www.youtube.com/watch?v=DFgSi1uc-3s> (14 minutes)
- *Bleeding* <https://www.health.ny.gov/professionals/ems/pdf/srgpsbleeding.pdf> (2 pages)
- *Basic Overview of Shock* <https://www.ems1.com/ems-products/medical-equipment/airway-management/tips/422245-A-basic-overview-of-shock/> (5 pages)

Week 5 Trauma and Splinting

Activity/Discussion: Students will understand how trauma patients differ from typical medical patients, and why/how emergency care changes for trauma. Students will learn basic trauma skills such as taking c-spine precautions and understanding how/when to perform different variants of splinting.

Assignments: Complete readings.

Readings (# pages): 58 Pages Total

Faculty Sponsor: Absent

- *Emergency & Trauma Care Training Course*
<http://www.who.int/surgery/publications/s16382e.pdf> (pages 5-63; 58 Pages)

Week 6 Cardiovascular emergencies

Activity/Discussion: Students will be introduced to the anatomy and physiology of the cardiovascular system. Students will also be introduced to various types of cardiovascular emergencies. These include cardiac arrhythmias, myocardial infarction, congestive heart failure. Students will learn how they can treat these emergencies as well as how they are treated in the prehospital setting.

Assignments: Complete Readings. Submit final project idea blurb on Sakai (1-2 paragraphs).

Prompt will read: "Provide a brief description regarding your idea for a final project, and list out some of the aspects of the emergency you will discuss in the paper."

Readings (# pages): 52 Pages Total

Faculty Sponsor: Absent

- Cardiovascular emergencies ([http://www.emsonline.net/assets/2009-CBT434-CardiovascularEm\(01-01-09\).pdf](http://www.emsonline.net/assets/2009-CBT434-CardiovascularEm(01-01-09).pdf)) (16 pages)
- Cardiovascular system (<https://my.clevelandclinic.org/health/body/21833-cardiovascular-system>) (5 pages)
- Cardiac arrhythmias (<https://www.mayoclinic.org/diseases-conditions/heart-arrhythmia/symptoms-causes/syc-20350668>) (5 pages)
- Congestive heart failure (<https://www.mayoclinic.org/diseases-conditions/heart-failure/symptoms-causes/syc-20373142>) (3 pages)
- Heart attack first aid (<https://www.mayoclinic.org/first-aid/first-aid-heart-attack/basics/art-20056679>) (2 pages)
- Cardiovascular disease: <https://pubmed.ncbi.nlm.nih.gov/22593934/> (21 pages)

Week 7: Neurologic emergencies

Activity/Discussion: Students will be introduced to the brain and basic neuroscience. Students will learn about the pathophysiology behind various neurologic emergencies including stroke, transient ischemic attack, and seizures. Immediate care for neurologic emergencies will be discussed, in addition to prehospital and emergency department care.

Assignments: Complete Readings. Work on final paper.

Readings (# pages): 55 Pages Total

Faculty Sponsor: Present

- Prehospital Assessment and Care of the Stroke Patient
<https://www.emsworld.com/article/10323034/prehospital-assessment-and-care-stroke-patient> (10 pages)
- General stroke (<https://www.mayoclinic.org/diseases-conditions/stroke/symptoms-causes/syc-20350113>) (5 pages)
- Mini stroke vs. regular stroke (<https://www.mayoclinic.org/diseases-conditions/transient-ischemic-attack/expert-answers/mini-stroke/faq-20058390>) (4 pages)

- Seizures overview (<https://www.mayoclinic.org/diseases-conditions/seizure/symptoms-causes/syc-20365711>) (5 pages)
- Seizure Etiology and Management (<https://pubmed.ncbi.nlm.nih.gov/31324320/>) (1-32; 31 pages)

Week 8: Diabetic Emergencies

Activity/Discussion: Students will be taught the anatomy and physiology pertaining to the pancreas and its role in the endocrine system. Students will learn the pathophysiology of diabetes mellitus in addition to acute diabetes emergencies, such as hypoglycemia, hyperglycemia, and diabetic ketoacidosis. Students will be introduced to pharmacological interventions EMS providers use to treat acute diabetic conditions, including oral glucose, dextrose, and glucagon.

Assignments: Complete Readings.

Readings (# pages): 68 Pages Total

Faculty Sponsor: Absent

- What is Type 1 Diabetes? (<https://www.cdc.gov/diabetes/basics/what-is-type-1-diabetes.html>) (5 pages)
- Assessment & Treatment of Five Diabetic Emergencies (<https://www.jems.com/patient-care/assessment-treatment-of-five-diabetic-emergencies/>) (5 pages)
- Recognizing and Treating Hypoglycemia (<https://www.jems.com/patient-care/recognizing-treating-hypoglycemia-hyperg/>) (7 pages)
- Diabetic Ketoacidosis (<https://www.mayoclinic.org/diseases-conditions/diabetic-ketoacidosis/symptoms-causes/syc-20371551>) (5 pages)
- Acute Metabolic Emergencies in Diabetes (<https://pubmed.ncbi.nlm.nih.gov/32488607/>) (5-47; 42 pages)

Week 9: Poisoning/Bites/Stings and Allergies

Activity/Discussion: Students will be introduced to the various types of bites/sting/poisoning injuries and treatments. This will include snake/spider bites, dog bites, animal bites, marine animal envenomation, and bees/wasp stings. A discussion of anaphylactic shock and allergies will follow, and a look into emergency treatment of anaphylaxis with diphenhydramine and epinephrine in the prehospital setting.

Assignments: Complete Readings. Work on final paper.

Readings (# pages): 53 Pages Total

Faculty Sponsor: Absent

- *What to do about venomous stings and bites* <http://www.emsworld.com/article/10324062/stings-and-bites-what-do-about-envenomation-injuries> (7 pages)
- *What to do about Animal Bites* <https://www.webmd.com/first-aid/animal-bites-treatment> (3 pages)
- *Anaphylaxis and its Treatments* <https://www.emsworld.com/213743/ce-article-anaphylaxis-and-its-treatment> (12 pages)
- *Oral Allergen Immunotherapy* <https://www.aaaai.org/conditions-and-treatments/library/allergy-library/oit> (3 pages)
- *Allergen immunotherapy for allergic asthma: a systematic overview of systematic reviews* <https://link.springer.com/content/pdf/10.1186/s13601-017-0160-0.pdf> (12 pages)
- *An economic evaluation of immediate vs non-immediate activation of emergency medical services after epinephrine use for peanut-induced anaphylaxis* https://www.sciencedirect.com/science/article/pii/S1081120618305726?casa_token=9DfNMg_Le

[e0AAAAA:JcPm824IFLbQD91pDiYLiKCFYlFwwgBML5qcq0Is3T4E6iLQaRB2ZziXAEu9N-pQcDhCiKg_Og](https://pubmed.ncbi.nlm.nih.gov/33420637/) (6 pages)

- *Snake Bite Early Diagnosis* (<https://pubmed.ncbi.nlm.nih.gov/33420637/>) (10 pages)

Week 10: Toxicology

Activity/Discussion: Students will learn about various causes of intoxication including acute alcohol intoxication and intoxication with other substances including opioids, amphetamines, sedatives, and hallucinogens. A discussion of the opioid overdose antidote Naloxone will follow.

Assignments: Complete readings. Continue work on final paper.

Readings (# pages): 56 Pages Total

Faculty Sponsor: Present

- Prehospital Care of the Intoxicated Individuals
<https://www.emsworld.com/article/10324347/prehospital-care-intoxicated-individual> (5 pages)
- Naloxone <https://www.drugabuse.gov/publications/drugfacts/naloxone> (5 pages)
- Psychological Disorders: A General Overview
<https://www.emsworld.com/article/10324393/psychological-disorders-general-overview> (15 pages)
- Prehospital Assessment and Care of the Stroke Patient
<https://www.emsworld.com/article/10323034/prehospital-assessment-and-care-stroke-patient> (10 pages)
- Understanding the Dangers of Alcohol Overdose
<https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/understanding-dangers-of-alcohol-overdose> (5 pages)
- Unintentional Pediatric Exposures to Marijuana in Colorado, 2009-2015
<https://jamanetwork.com/journals/jamapediatrics/fullarticle/2534480> (10 pages)
- Alcohol Withdrawal Syndrome <https://www.aafp.org/afp/2004/0315/p1443.html> (6 pages)

Week 11: Environmental emergencies, Burns

Activity/Discussion: Students will discuss hyperthermia and hypothermia and treatments for these conditions. They will identify vulnerable populations in each and how appropriate precautions can be taken. Students will understand/discuss burns of different degrees and of different cause (chemical, thermal, electrical, etc.). Students will learn basic burn first aid treatment and will understand how treatment will change depending on severity and cause of the burn.

Assignments: Complete Readings. Pick any 5 personal burn stories from Phoenix Society Personal Stories and be prepared to discuss the most interesting findings with the class.

Readings (# pages): 76 Pages Total

Faculty Sponsor: Present

- *Anatomy & Physiology Unit 1; Levels of Organization; Chapter 4. The Tissue Level of Organization; 4.6 Tissue Injury and Aging* (<https://openstax.org/books/anatomy-and-physiology/pages/4-6-tissue-injury-and-aging>) (6 pages)
- *Phoenix Society Personal Stories* (<https://www.phoenix-society.org/resources/personal-stories>) (30 pages)
- *Burn Evaluation and Management* (<https://www.ncbi.nlm.nih.gov/books/NBK430741/#:~:text=If%20the%20patient%20appears%20to,and%20possible%20associated%20traumatic%20injuries>) (20 pages)

- *Environmental Emergencies* <http://www.emsworld.com/article/10287438/environmental-emergencies> (5 pages)
- *Miracle on Ice* <http://www.snopes.com/medical/myths/jeanhilliard.asp> (5 pages)
- *Nobody is Dead Until Warm and Dead* <http://www.sciencedirect.com/science/article/pii/S0300957214005243> (10 pages)

Week 12: Present Final Projects

Activity/Discussion: Each student will turn in their final paper and give a 5- minute presentation on their findings. Time for questions will be allowed after each presentation.

Assignments: Turn in 5-page paper on Sakai and prepare a brief presentation with a visual component to share with the class.

Readings (# pages): No additional readings this week.

Faculty Sponsor: Present

Faculty Sponsor Visits

Faculty sponsor George Grody will be present during weeks 1, 2, 7, 10, 11, and 12.