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### Objectives

- Overview of glucometer use and troubleshooting equipment
- Understanding signs, symptoms and treatment for diabetic keto-acidosis
- Understanding signs, symptoms and treatment for hyperglycemic hyperosmolar state
- Understanding signs, symptoms and treatment for graves disease
- Understanding signs, symptoms and treatment for thyroid storm
- Understanding signs, symptoms and treatment for addison crisis

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### Glucometer

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## Glucometer

- Proper usage is important!
  - Make sure it is not too cold
  - Make sure you let the alcohol swab dry

### Error Messages

Er1: A used test strip was inserted.  
Repeat the test with a new test strip.

Er2: The blood or control solution sample was applied before the ▲ symbol appeared.  
Repeat the test with a new test strip and wait until the ▲ symbol appears before applying the blood or control solution sample.

Er4: The blood sample has abnormally high viscosity or insufficient volume. Repeat the test with a new test strip.

Er5: This error message may appear when the wrong blood glucose test strip is used instead of an Asure Prism multi Blood Glucose Test Strip.  
Repeat the test with an Asure Prism multi Blood Glucose Test Strip.

Er6: There is a problem with the meter.  
Do not use the meter. Contact Customer Service at 800-818-8877, 24 hours a day, 7 days a week, USA and Canada.

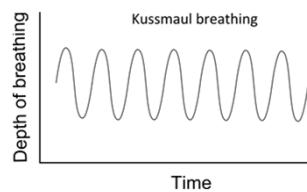


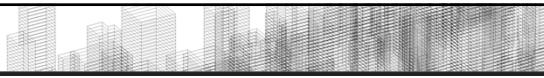
## Diabetic Ketoacidosis (DKA)

- Usually occurs with type I diabetics
- DKA will have levels of 300 mg/dl or higher
- "Poly-s"
  - Polyuria -urinate a lot
  - Polydipsia - drink a lot
  - Polyphagia - eat a lot

## Diabetic Ketoacidosis (DKA)

- Kussmaul breathing - trying to offset the acidosis by removing CO<sub>2</sub>
  - Deep and rapid breathing
- Alcohol or Ketone smell
- Potential Potassium issues
  - Cardiac monitoring





### Diabetic Ketoacidosis (DKA)

- Causes
  - Stress
  - Missing Insulin doses
  - Illness

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### Hyperglycemic Hyperosmolar State (HHS/HHNS)

What is the difference between this and DKA?

- Usually with type 2 diabetics
- Still processing some glucose -> so no breakdown of fats
- No Kussmaul breathing; no ketone breath
- Slow onset
- Often with altered mental status
- Often caused by infection or illness

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### Hyperglycemia treatment

- Fluid resuscitation with normal saline. Repeat as needed to effect age appropriate systolic blood pressure
- Contraindication: evidence of CHF

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**Hyperglycemic patient scenario**

- Patient asks, "I have insulin. If my blood sugar is high, then can I just take that and stay home?"



**Graves Disease**

- Form of Hyperthyroidism
  - Occurs when the thyroid gland becomes hyperactive and secretes too much thyroxine
- Most common in women under the age of 40
- Signs and symptoms
  - Anxiety and irritability
  - Heat intolerance
  - Malaise, tiredness, weakness
  - Weight loss
  - Frequent bowel movements
  - Rapid or irregular heart rhythms
  - Goiter of the neck
  - Bulging eyes
  - pretibial myxedema



**Graves Disease**

- Can lead to
  - Atrial Fibrillation, vision loss, heart failure, stroke
- Do a stroke scale!

## Thyroid Storm

- When there is an overwhelming amount of thyroxine circulating the body thyroid storm occurs
- Common Causes
  - Undiagnosed or untreated hyperthyroidism (such as Grave's disease)
  - Illness, trauma, or stress
  - Taking other medications that increase thyroid activity level (ASA, radioactive iodine)

## Thyroid Storm

- Signs and Symptoms
  - Altered mental status
  - Hypertension
  - Tachycardia
  - Tachypnea
  - Hyperthermia
- Treatment
  - IV bolus
  - Dextrose as needed
  - Cooling

## Addison's disease/Hypocortisolism (Adrenal Crisis)

- Addisonian Crisis accounts for 15% of deaths in patients with Addison's disease
- Signs and Symptoms
  - Sudden penetrating pain in large muscle groups
  - Nausea
  - Vomiting
  - Diarrhea
  - Hypotension
  - Syncope
  - Hypoglycemia
  - Seizure
  - Fever
  - Cardiac dysrhythmias
  - hyperkalemia



### Addison's disease/Hypocortisolism (Adrenal Crisis)

- Treatment
  - Good BLS airway management
  - Aggressive IV bolus therapy
  - Multiple doses of dextrose\* (medical control order)
  - Maximum Dextrose administration is 50mL of age-appropriate concentration. Additional amounts must be authorized by On-Line Medical Control.
  - Prednisone\*/Solumedrol\* (medical control order)

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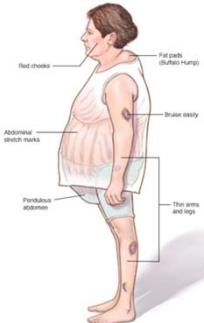
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### Cushing's Syndrome

- Excess cortisol
- Often related to steroid medication abuse or iatrogenic overuse
- Common symptoms
  - Central obesity
  - Thin frail skin
  - Purple or red striae on trunk, buttocks, arms, legs or breasts




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**Thank you**

ayoon@co.lucas.oh.us

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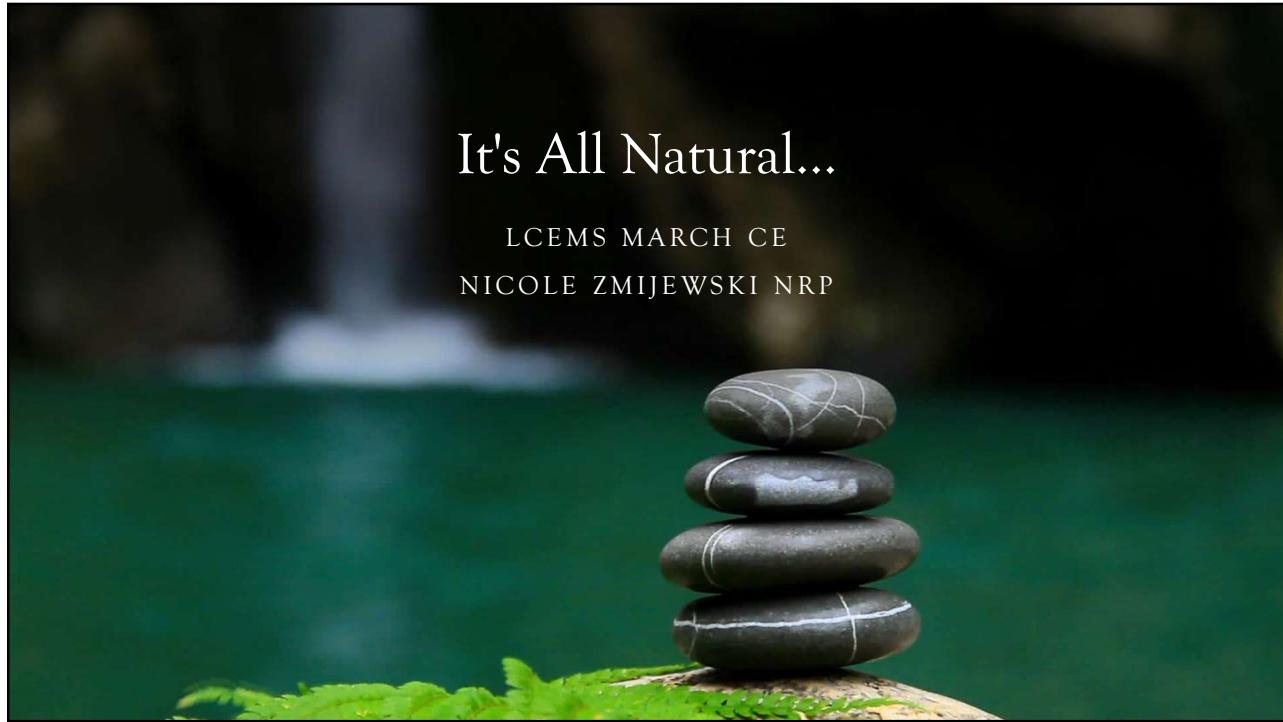
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## It's All Natural...

LCEMS MARCH CE  
NICOLE ZMIJEWSKI NRP



It's All Natural....

Any oils to help with atrial fibrillation?

1 9 comments

256 101 Comments

Like Comment

Coumadin oil  
Amiodarone oil for RVR  
Cardizem Oil

You can also use the oil of cardiovert

## Objectives



Identify who uses alternative therapies



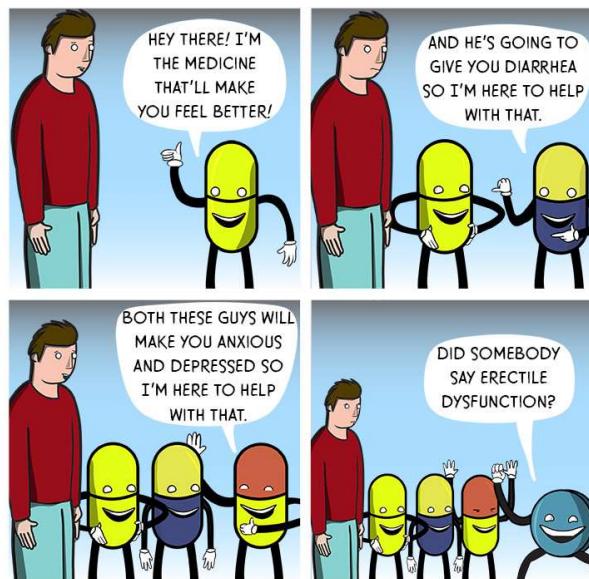
List reasons alternative therapies benefit the immune response



Identify types of alternative therapies



List adverse effects of herbal medications

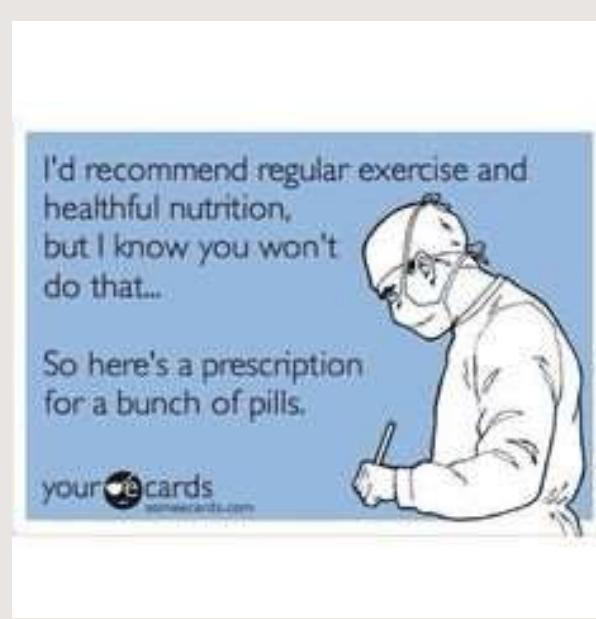




## SIDE EFFECTS

Dry mouth, dizziness, cramps, rashes, impotence, stroke, V.D., bad credit, fever, memory loss, anal leakage, joint pain, ill fitting shoes, heart attack...  
Maybe I'll just live with my itchy eyes

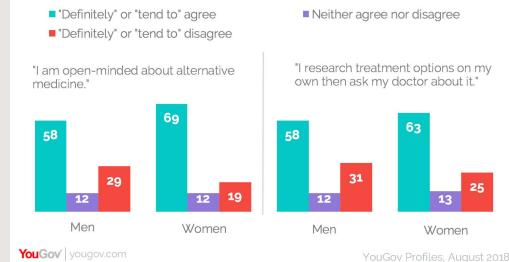
[motifake.com](http://motifake.com)



## Characteristic Users

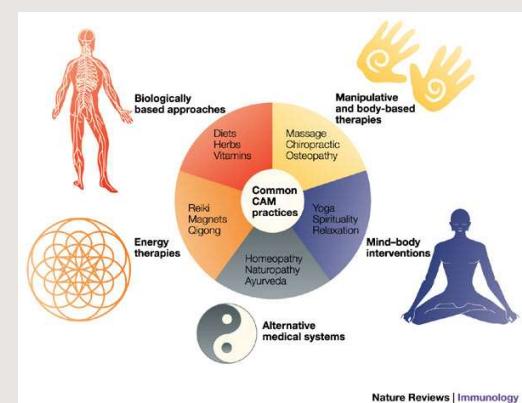
- Female
- Middle aged
- Well educated
- Middle class
- White

### Women are more likely to be open to alternative medicine



## Alternative Medicine

- Acupuncture
- Chiropractic medicine
- Massage therapy
- Cupping
- Mind-Body Medicine
- Energy Therapy
- Herbal medicine
- Homeopathic medicine



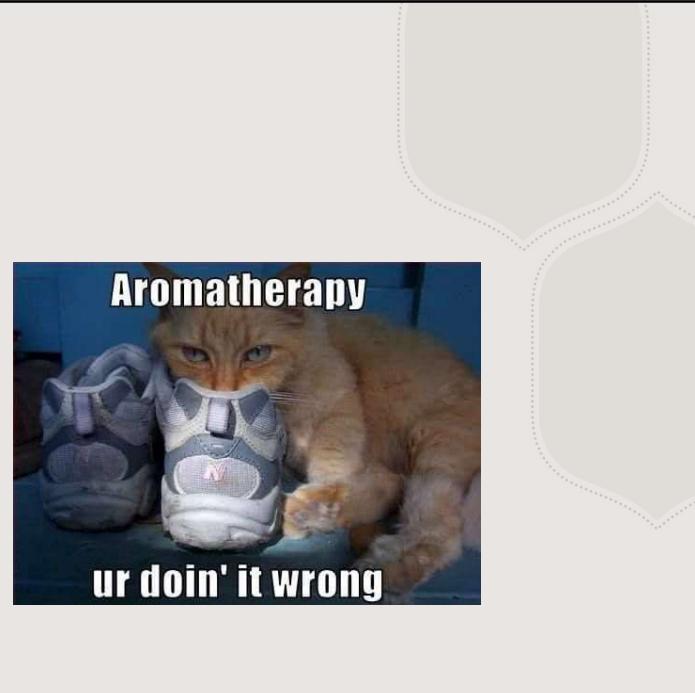
## History

- 200-year-old therapeutic system
- Goal: stimulate self-healing
- Provided alternatives to "abusive treatments"
- Current day homeopathic medicine
  - Individualized care plans
  - Time
  - Inexpensive
- Individual research



## Herbal Medications

- Not regulated by the FDA
- Cranberry and UTI's!!!!
- Family traditions
- Adverse effects - What???
  - Toxicity
  - OD
  - Herb contamination
  - Interactions



## Interactions

### PHARMACOKINETIC

- Interactions between herbal supplement and a drug
- Affect the drug concentration

### PHARMACODYNAMIC

- Direct actions between the drug and the supplement
- Does not affect drug concentration
- Antagonizes or exacerbates the effect of the drug



What might people be taking???



## Saffron

- Stem-less herb
- Cardioprotective effect
- Reduces cholesterol
- Effects comparable to amiodarone
- Inhibits some cancer cell proliferation
- Side Effects: Anxiety, anorexia, H/A, N/V, constipation, tachycardia, tremors, sexual dysfunction
- **Provider Warning:**  
Causes renal/liver injury  
Spontaneous abortion



## Ginger

- Cardioprotective
- N/V
- Mechanism of action?
- **Provider Warning:**  
Significant increase in Fibrinolytic activity  
Mild GI side effects



## Garlic

- Antineoplastic effects - Stomach/colon/lung
- Cardiovascular benefits
- Provider Warning
  - Digitalis toxicity
  - Anticoagulant issues
  - CNS bleeding
  - Burns
  - GI



## Hawthron

- Cardioprotective
- Provider Warning:
  - Enhances Digitalis activity



## Ginkgo Biloba

- Antioxidant
- Inhibits platelet aggregation
- Improves cognitive function
- **Provider Warning:**  
Spontaneous bleeding
- Monitor for bruising, bleeding, new-onset h/a, vision changes



## St. John's Wort

- Natural antidepressant
- **Provider Warning:**  
Half-life 24-48 hours  
Effects in vitro
- Drug/Drug interactions
- Side effects: Dry mouth, dizziness, anxiety, confusion, diarrhea, constipation, GI discomfort, fatigue, itching, erythematous lesions



## Ginseng

- Advertised to:
  - Strengthen normal functions
  - Improve sexual function
  - Increase resistance to stress
  - Increase energy
- **Provider Warning:**
  - Herb to anticoagulant interaction
  - Decrease blood sugar



## Milk Thistle

- Utilized as:
  - Cytoprotectant
  - Anticarcinogen
  - Supportive care for liver disease (cirrhosis)
- **Provider Warning:**
  - Side effects: GI disturbances, rashes, allergic reactions.
  - Decreases the concentration of: Dilantin, Valium, Warfarin*



## Black Cohosh

- Used for menopause symptoms
- **Provider Warning:**
  - Side effects: GI distress, rashes, breast pain, vaginal bleeding, musculoskeletal aches, dark urine, jaundice
  - Reduces the effectiveness of amiodarone



## Goldenseal

- Most popular
- Uses: cold symptoms, pink eye, diarrhea, UTI's, canker sores, and vaginitis
- Positive drug test????
- **Provider Warning:**
  - Increases effects of digoxin and blood thinners
  - Decreased metformin
  - Toxic to newborns



## Kava Kava

- Herbal sedative
- Provider Warning:
  - Extrapyramidal effects -dyskinesia and torticollis
  - Increased bleeding with Coumadin
  - Inhibits Dilantin and Depakote
  - Enhanced effects with Xanax and Tagamet
  - Skin effects with sun exposure



When it comes to herbal meds, questions to ask.....

- Are you taking an herbal product, supplement, or other natural remedy?
- Are you taking any prescription or nonprescription medications for the same purpose as the herbal product?
- Have you used this herbal product before?
- Are you allergic to any plant products?
- Are you pregnant or breast-feeding?





# SEPSIS

SHAWN WITTKOP NRP EMT-I BSN

HOW WOULD YOU DEFINE SEPSIS?

- SEPSIS IS...
  - THE BODY'S EXTREME RESPONSE TO AN INFECTION
  - A LIFE-THREATENING MEDICAL EMERGENCY
  - SEPSIS HAPPENS WHEN AN INFECTION YOU ALREADY HAVE TRIGGERS A CHAIN REACTION THROUGHOUT YOUR BODY
  - INFECTIONS THAT LEAD TO SEPSIS MOST OFTEN START IN THE LUNG, URINARY TRACT, SKIN, OR GASTROINTESTINAL TRACT (INFECTIOUS SOURCE)
  - WITHOUT TIMELY TREATMENT, SEPSIS CAN RAPIDLY LEAD TO TISSUE DAMAGE, ORGAN FAILURE, AND DEATH.

**WHAT IS SEPSIS?**

Sepsis is the body's overwhelming and life-threatening response to infection which can lead to tissue damage, organ failure, and death.

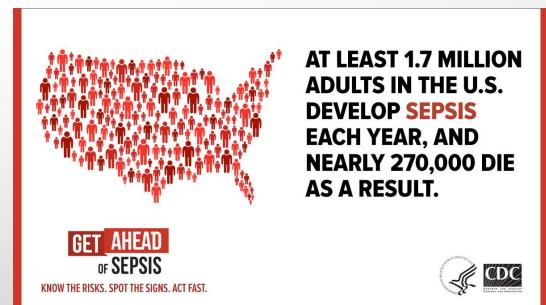
270,000 DEATHS IN UNITED STATES  
8,000,000 DEATHS ACROSS THE GLOBE

EACH YEAR, MORE THAN 270,000 PEOPLE IN THE U.S. DIE FROM SEPSIS. WORLDWIDE, THAT FIGURE IS 8 MILLION.

65% OF AMERICANS SAY THEY KNOW THE WORD

## SEPSIS EPIDEMIOLOGY

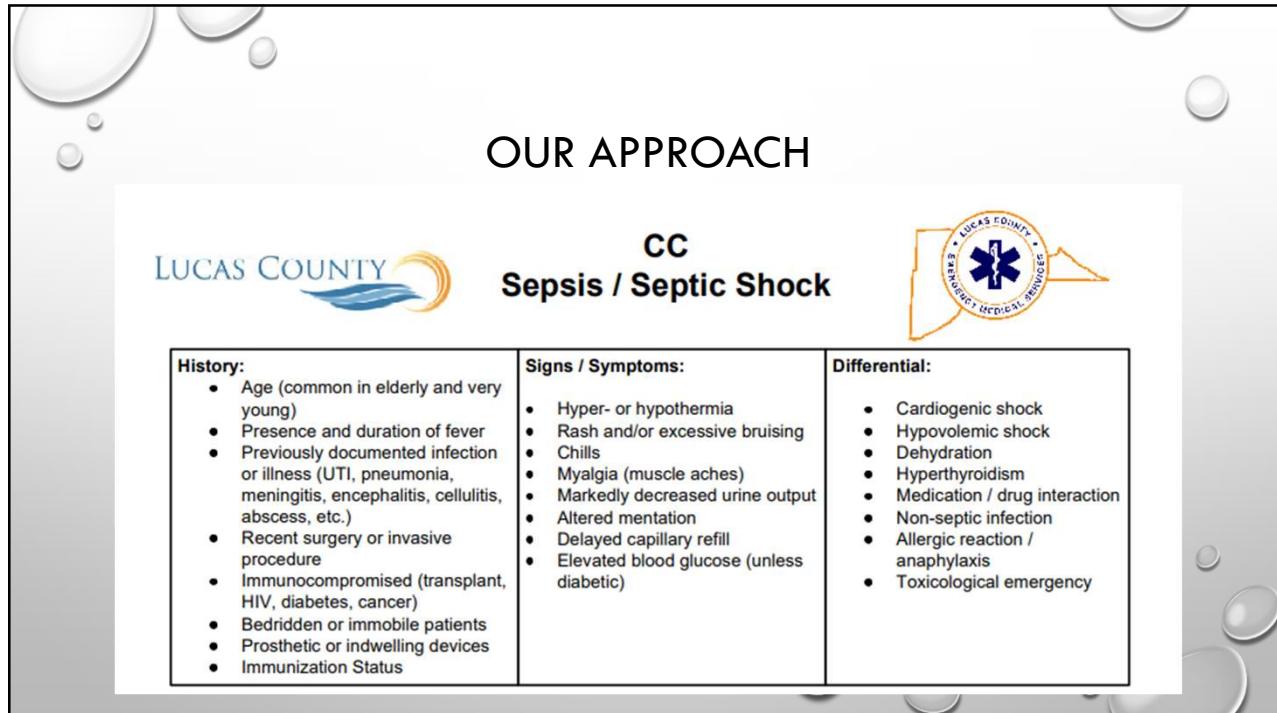
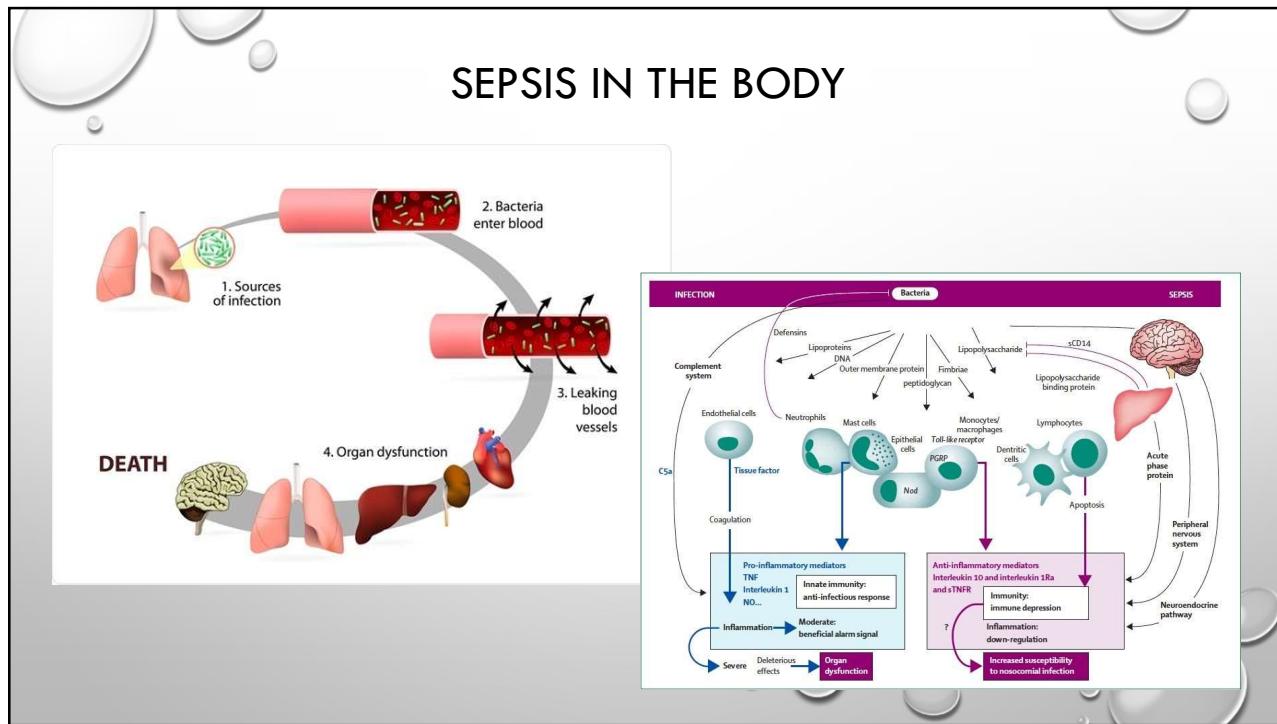
- SEPSIS
  - 1.7 MILLION CASES PER YEAR IN THE US
    - 270,000 DEATHS PER YEAR
      - PUBLIC HEALTH ISSUE
  - COMPARED TO THE TOP 3 DISEASE DEATHS IN THE US IN 2020
    - CARDIAC - 696,962
    - CANCER - 602,350
    - COVID 19 - 350,831

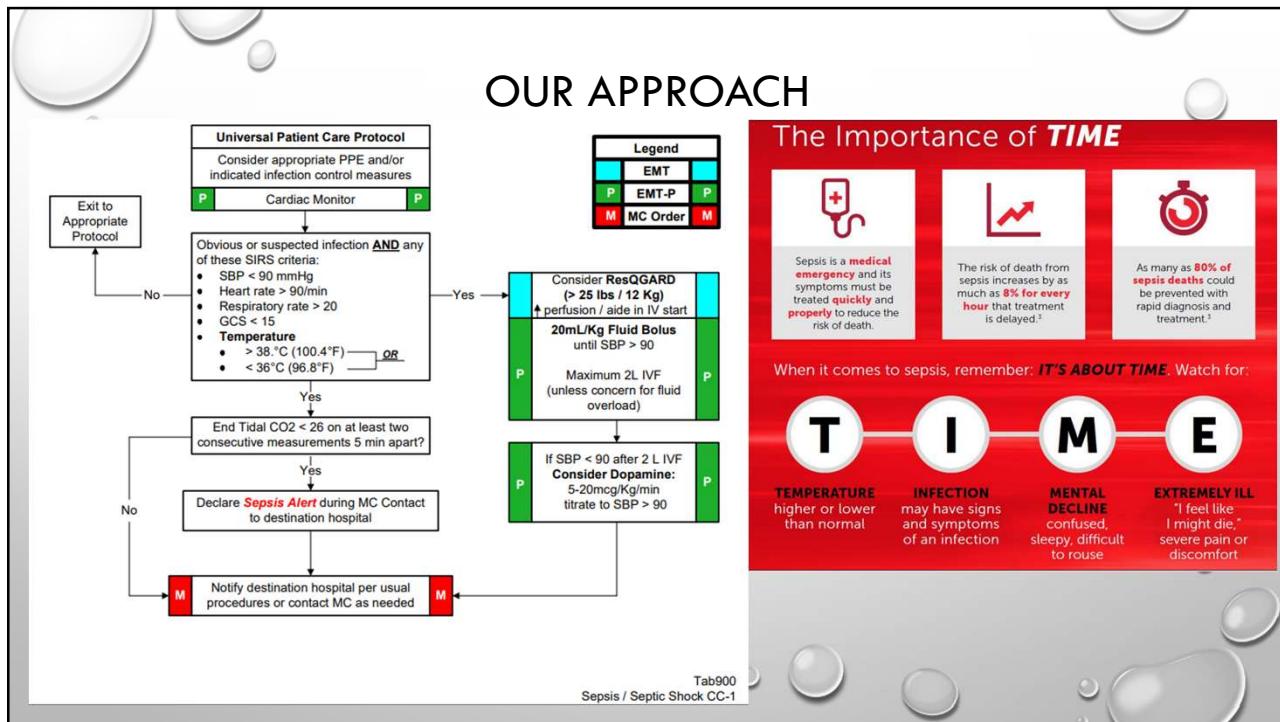


## HISTORY OF THIS TERM CALLED SEPSIS

- 1991 – SEPSIS-1
  - A PATIENT'S SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS) CRITERIA)
- 2001 - SEPSIS-2
  - SEPSIS (DEFINED AS A PROVEN OR SUSPECTED INFECTION IN COMBINATION WITH AT LEAST 2 SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS) CRITERIA) AND PERSISTENT HYPOTENSION (DEFINED AS A MEAN ARTERIAL PRESSURE BELOW 60 MM HG, A SYSTOLIC BLOOD PRESSURE BELOW 90 MM HG OR A DECREASE IN SYSTOLIC BLOOD PRESSURE OF AT LEAST 40 MM HG) DESPITE ADEQUATE FLUID RESUSCITATION
- 2016 – SEPSIS-3
  - SEPSIS IS DEFINED AS LIFE-THREATENING ORGAN DYSFUNCTION CAUSED BY A DYSREGULATED HOST RESPONSE TO INFECTION. SOFA AND QSOFA







## SPECIAL CONSIDERATIONS

- EARLY RECOGNITION OF SEPSIS ALLOWS FOR THE ATTENTIVE CARE
  - IV FLUIDS – ADULTS – MAX 2 LITERS UNLESS SIGNS OF CHF OR ESRD DEVELOP
- ETCO<sub>2</sub>
  - LOW LEVELS OF  $< 26$  "TRENDED" CORRESPOND WITH ELEVATED SERUM LACTATE LEVELS
    - MAY HELP CONFIRM INADEQUATE ORGAN AND TISSUE PERfusion LEADING TO HYPOXIA AND METABOLIC ACIDOSIS
- DIC (DISSEMINATED INTRAVASCULAR COAGULATION) – LATE SIGN
  - SEVERE DYSPNEA ASSOCIATED WITH EXTENSIVE BRUISING

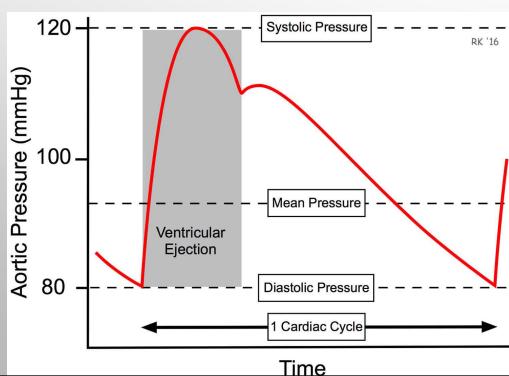
## “IT'S SO EASY, EVEN A LIFE PACK COULD DO IT”

- TRENDING VITAL SIGNS
  - THE USE OF MORE THAN ONE SET OF VITAL SIGNS TO DETECT CHANGES OR “TRENDS” IN PATIENT CONDITIONS



## THE MAP THE MAP THE MAP...

- MEAN ARTERIAL PRESSURE
  - THE MEASUREMENT THAT EXPLAINS THE AVERAGE BLOOD PRESSURE IN A PERSON'S BLOOD VESSELS DURING A SINGLE CARDIAC CYCLE
- VITAL TO HAVE A MAP OF AT LEAST 65 MMHG TO PROVIDE ENOUGH BLOOD TO THE CORONARY ARTERIES, KIDNEYS, AND BRAIN
- THE NORMAL MAP RANGE IS BETWEEN 70 AND 100 MMHG
- MEAN ARTERIAL PRESSURES THAT DEVIATE FROM THIS RANGE FOR PROLONGED PERIODS OF TIME CAN HAVE DRASTIC NEGATIVE EFFECTS ON THE BODY
  - SEPSIS???



$$MAP = \frac{2 * DBP + SBP}{3}$$

## DECLARE THE SEPSIS ALERT



**LUCAS COUNTY**  **CC** **Sepsis / Septic Shock** 

Special Considerations for Sepsis (cont.):

**Sepsis Alert**

The purpose of a Sepsis Alert is to provide pre-arrival Emergency Department notification in order to facilitate rapid assessment and treatment of a suspected severe sepsis patient. Sepsis Alert patients should be transported to a hospital with on-site intensive care service (NOT a free standing Emergency Department).

A **Sepsis Alert** will be declared for patients meeting the following 3 criteria:

1. Suspected infection
2. Two or more of the following:
  - Temperature  $> 38^{\circ}\text{C}$  ( $100.4^{\circ}\text{F}$ ) OR  $< 36^{\circ}\text{C}$  ( $96.8^{\circ}\text{F}$ )
  - Respiratory rate  $> 20$  breaths/min
  - Heart rate  $> 90$  beats/min
3.  $\text{ETCO}_2 < 26$  mm Hg OR Lactate  $> 4$  mmol

**Advanced Life Support:**

- Full ALS assessment and treatment
- Notify hospital of incoming **Sepsis Alert** prior to arrival
- Consider ResQGARD (ITD) to increase perfusion / aide in IV start
- Administer 20mL/kg fluid bolus until SBP  $> 90$  mmHg
- Total amount of IVF should not exceed 2 Liters
- If SBP remains  $< 90$  mm Hg following fluid administration: Dopamine infusion at 5-20 mcg/kg/min titrated to maintain SBP  $> 90$  mmHg

## ESO FORMS TAB SEPSIS ALERT

**PREREQUISITES**

**QSOFA**

**SIRS**

**Sepsis Screening**

Do NOT screen patients that are pregnant or under the age of 18.

Time Performed: 15:41:32 Date: 02/14/2022

**Prerequisites**

Infection Suspected or Documented:  Yes  No

$\text{ETCO}_2 < 25$  mmHg:  Yes  No

Lactate Level  $> 4$  mmol/L:  Yes  No

**Quick Sepsis Organ Failure Assessment (qSOFA)**

Systolic Blood Pressure  $< 100$  mmHg:  Yes  No

Respiratory Rate  $> 22$  breaths/min:  Yes  No

Glasgow Coma Scale  $< 15$ :  Yes  No

**Criteria Met** 

**PREREQUISITES**

**QSOFA**

**SIRS**

**Sepsis Screening**

**Systemic Inflammatory Response Syndrome (SIRS)**

Temperature  $< 96.8^{\circ}\text{F}$  ( $36^{\circ}\text{C}$ ) or  $> 100.4^{\circ}\text{F}$  ( $38^{\circ}\text{C}$ ):  Yes  No

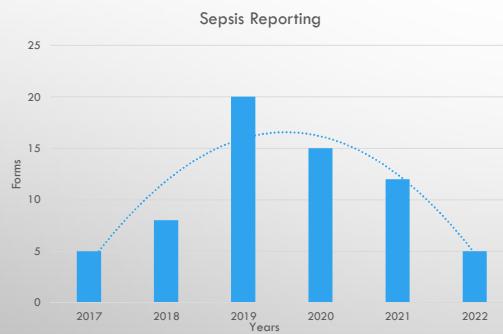
Heart Rate  $> 90$  bpm:  Yes  No

Respiratory Rate  $> 20$  breaths/min:  Yes  No

White Blood Cell Count  $< 4,000$  or  $> 12,000$  cells/mm $^3$ :  Yes  No

**Criteria Met** 

ESO DATA TRENDS



- SEPSIS FORMS
- QSOFA
- SIRS

Lucas County Emergency Medical Service Patient Care Record		Patient 1 of 1																																																																																																																																																								
<b>Patient Information</b> Last: [REDACTED] Address: [REDACTED] Primary Impression: Septic/Septicemia First: [REDACTED] Address 2: [REDACTED] Secondary Impression: [REDACTED] Middle: [REDACTED] City: [REDACTED] Protocol Used: Hyperglycemia Gender: [REDACTED] State: [REDACTED] Alert: Position: General/Global DOB: [REDACTED] Zip: [REDACTED] Onset Time: [REDACTED] Age: 70 Yrs, 8 Months, 4 Days Last Known Well: [REDACTED] Weight: 200.0lbs - 90.7kg Chief Complaint: altered level of consciousness Pedi Color: [REDACTED] Duration: 2 Units: [REDACTED] Hours: [REDACTED] Physician: [REDACTED] Secondary Complaint: [REDACTED] SSN: [REDACTED] Duration: [REDACTED] Units: [REDACTED] Race: white Patient's Level of Distress: [REDACTED] Advance Directives: [REDACTED] Resident Status: RESIDENT WITHIN EMS Service Area Signs & Symptoms: Metabolic - Hyperglycemia Patient Resides in Service Area: [REDACTED] Behavior/Emotional State - Slowness and [REDACTED] Temporary Residence Type: [REDACTED] Metabolic - Hypotension Metabolic - Septic		<h1>CASE STUDY</h1>																																																																																																																																																								
<b>Medications/Hallucinations/History/Immunizations</b> Medications: Amiodarone, Aspirin, Cymbalta, Fluconazole, Hydrocodone, Levoxylazine, Metoprolol, Miralax, Vitamin B12 Allergies: No known allergies History: Anemia, Atrial Fibrillation, Bipolar II Disorder, Cardiac Arrhythmia, Gastro-Esophageal Reflux Disease (GERD), Hyperlipidemia, hypertension (HTN), Hypotension, Kidney, Renal Failure, Urinary Tract Infection (UTI) Immunizations: [REDACTED] Last Oral Intake: [REDACTED]		<b>Assessments</b> <b>Assessments</b> <table border="1"> <thead> <tr> <th>Category</th> <th>Comments</th> <th>Subcategory</th> </tr> </thead> <tbody> <tr> <td>Skin</td> <td></td> <td>✓ Dry • Hot ✗ Clammy • Cold</td> </tr> <tr> <td>HEENT</td> <td></td> <td>Not Assessed</td> </tr> <tr> <td></td> <td></td> <td>Face Not Assessed</td> </tr> <tr> <td></td> <td></td> <td>Eyes ✓ Left: 30° - Reactive Right: 30° - Reactive ✗ Left: Clouded • Deformity • Non-Reactive Right: Deformity • Non-Reactive</td> </tr> <tr> <td>Chest</td> <td></td> <td>Neck Not Assessed</td> </tr> <tr> <td></td> <td></td> <td>Chest Not Assessed</td> </tr> <tr> <td>Abdomen</td> <td></td> <td>Heart Sounds Not Assessed</td> </tr> <tr> <td>Back</td> <td></td> <td>Heart Sounds Not Assessed</td> </tr> <tr> <td>Pelvis/GU/GI</td> <td></td> <td>General Not Assessed</td> </tr> <tr> <td>Extremities</td> <td></td> <td>Back Not Assessed</td> </tr> <tr> <td></td> <td></td> <td>Pelvis/GU/GI Not Assessed</td> </tr> <tr> <td></td> <td></td> <td>Left Arm Not Assessed</td> </tr> <tr> <td></td> <td></td> <td>Right Arm Not Assessed</td> </tr> <tr> <td></td> <td></td> <td>Left Leg Not Assessed</td> </tr> <tr> <td></td> <td></td> <td>Right Leg Not Assessed</td> </tr> <tr> <td>Neurological</td> <td></td> <td>Neurological ✓ Aphasia • Weakness - Left Sided • Weakness - Right Sided</td> </tr> </tbody> </table>		Category	Comments	Subcategory	Skin		✓ Dry • Hot ✗ Clammy • Cold	HEENT		Not Assessed			Face Not Assessed			Eyes ✓ Left: 30° - Reactive Right: 30° - Reactive ✗ Left: Clouded • Deformity • Non-Reactive Right: Deformity • Non-Reactive	Chest		Neck Not Assessed			Chest Not Assessed	Abdomen		Heart Sounds Not Assessed	Back		Heart Sounds Not Assessed	Pelvis/GU/GI		General Not Assessed	Extremities		Back Not Assessed			Pelvis/GU/GI Not Assessed			Left Arm Not Assessed			Right Arm Not Assessed			Left Leg Not Assessed			Right Leg Not Assessed	Neurological		Neurological ✓ Aphasia • Weakness - Left Sided • Weakness - Right Sided																																																																																																				
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## CASE STUDY

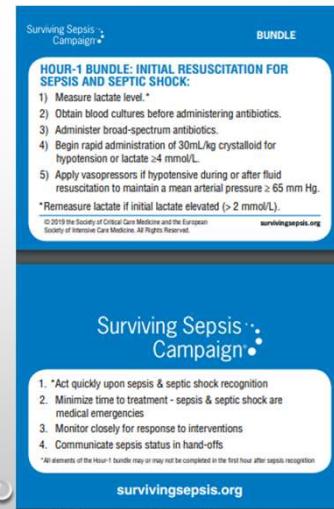
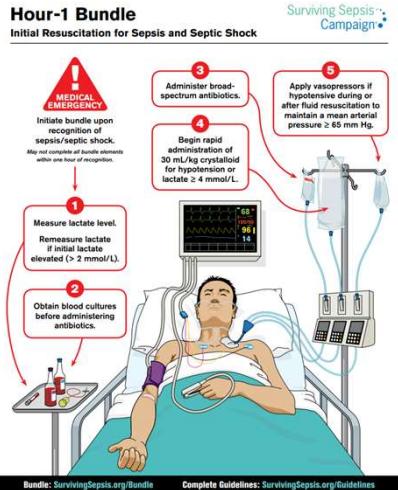
## PEDIATRICS

- FREQUENT REASONS FOR INFECTION
  - EARS
  - INFECTED WOUND
  - STREP
  - CONJUNCTIVITIS
  - RSV
  - ETC
- IV FLUIDS
  - 20ML / KG BOLUS
  - SBP  $>70 + 2 \times \text{AGE}$
  - MAX OF 2 LITERS
  - HANDEVY

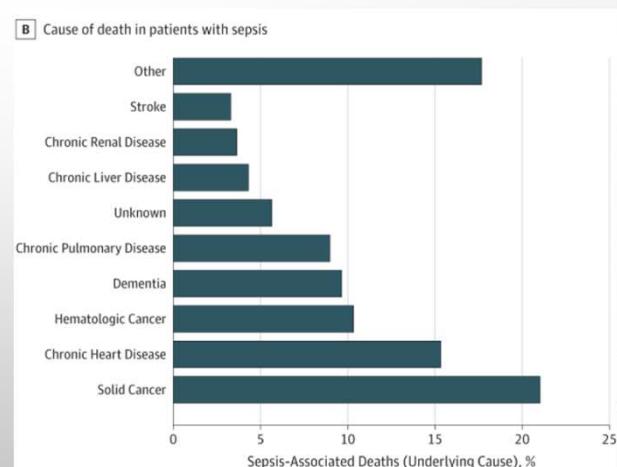
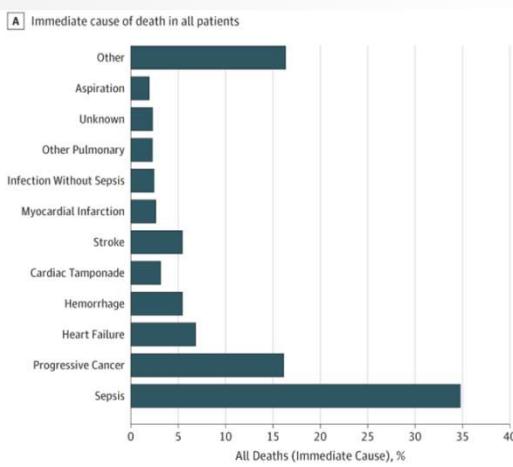
## EMS MOVEMENT

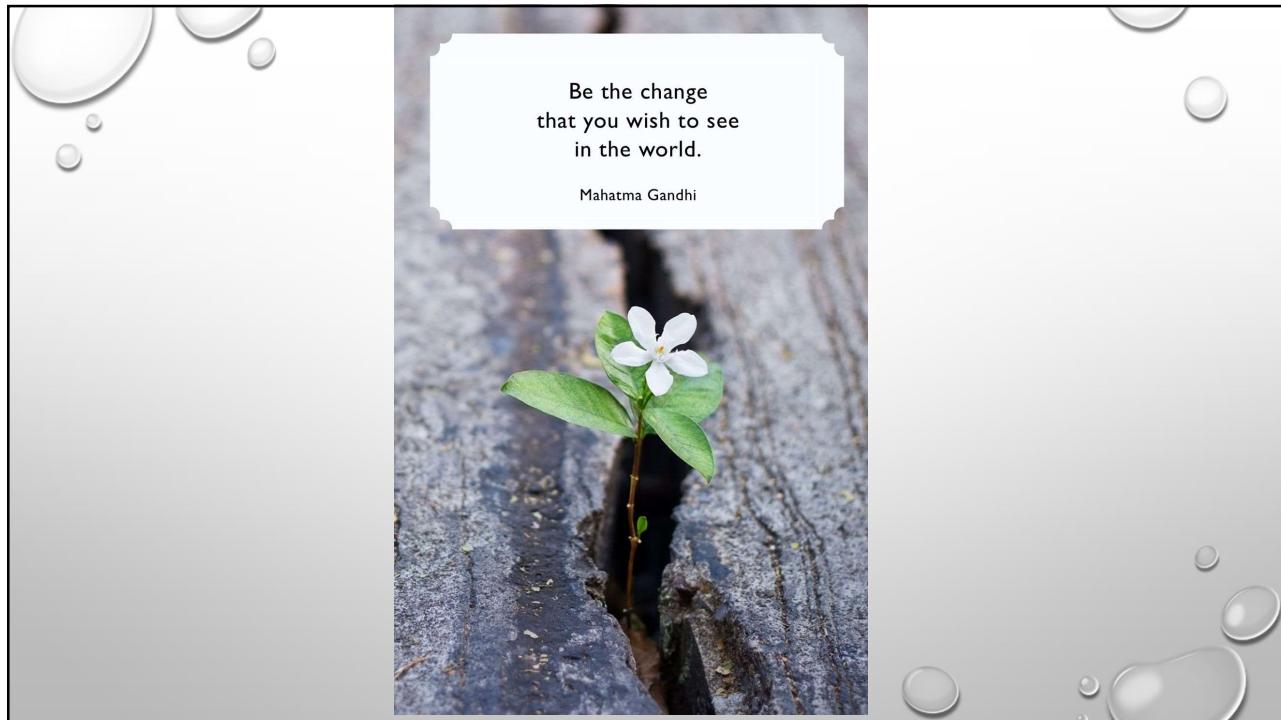


## REMEMBER THE CONVERSATION ABOUT TIME?



## MUCH WORK TO DO!





## REFERENCES

- SOCIETY FOR CRITICAL CARE MEDICINE
  - SURVIVING SEPSIS CAMPAIGN
  - SEPSIS ALLIANCE



## QUESTIONS

SWITTKOP@CO.LUCAS.OH.US

