

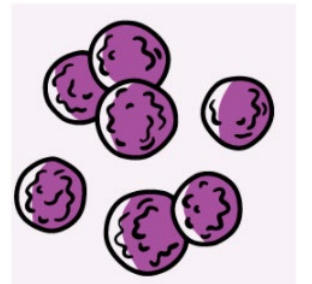
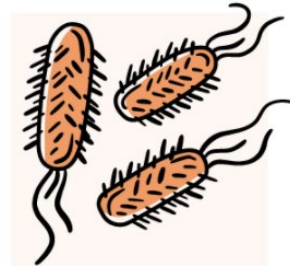
MULTIDRUG-RESISTANT ORGANISMS (MDROS)

Angela M. Warren, MS, BSN, RN, CIC
Clinical Infection Prevention Consultant

<https://spice.unc.edu/>
<https://spice.unc.edu/ask-spice/>

LEARNING OBJECTIVES

- ▶ Define Multidrug-Resistant Organisms
- ▶ Identify several types of Multidrug-Resistant Organisms (most common)
- ▶ Define colonization vs. infection
- ▶ Review how MDROs are spread
- ▶ Identify ways to stop the spread
- ▶ Review risk factors for getting a Multidrug-Resistant Organism



TERMS & DEFINITIONS

▶ **Bacteria:** One-celled organisms found inside and outside of our bodies. Most are not harmful, but some can cause infections

▶ **Antibiotics:** Drugs that fight infections caused by bacteria



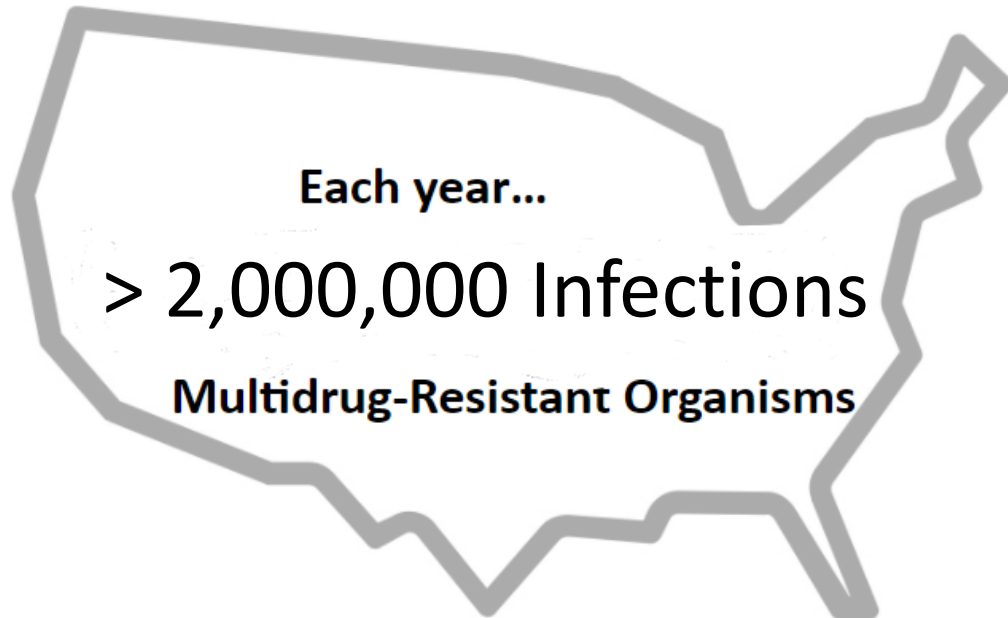
▶ **Antibiotic Resistance:** The ability of bacteria to fight the effects of an antibiotic

▶ **Multidrug-Resistant Organisms (MDROs):** Bacteria that have become resistant to 2 or more antibiotics

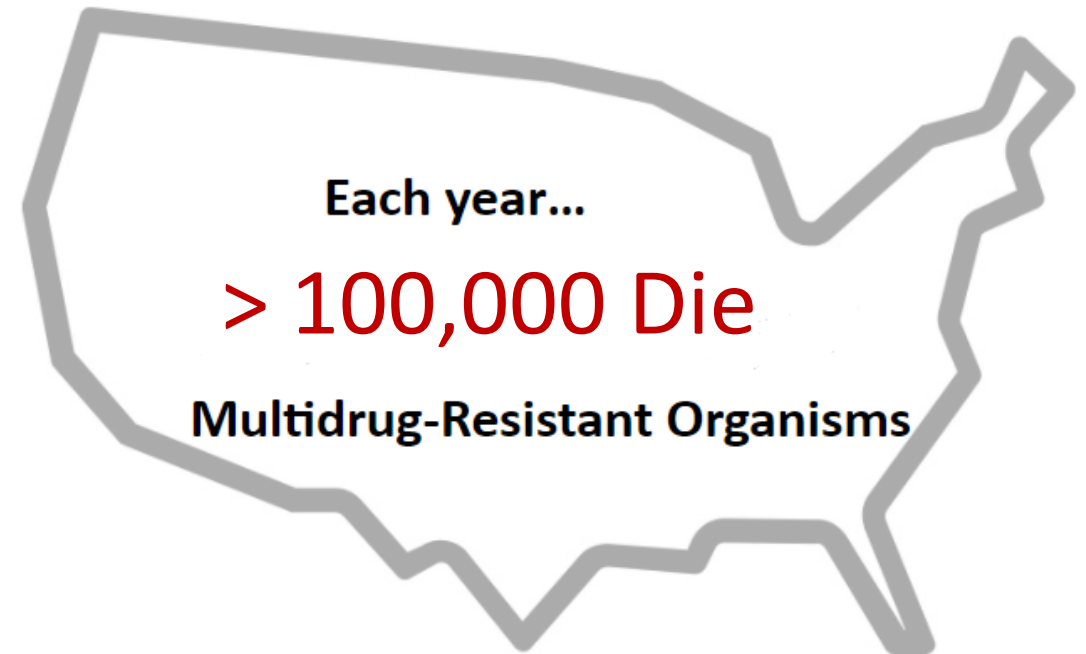


THE BURDEN OF MDROS

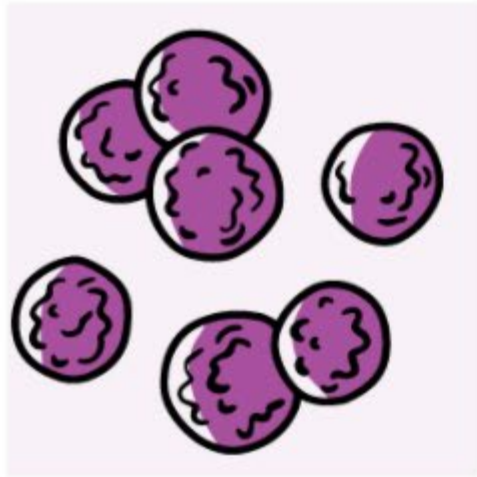
INFECTIONS/YEAR



DEATHS/YEAR



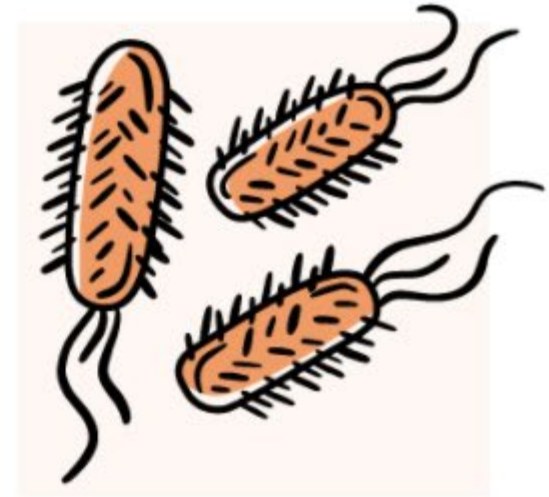
COMMON MDROS



MRSA



VRE



ESBL

E. coli/K. pneumoniae

OTHERS YOU SHOULD KNOW



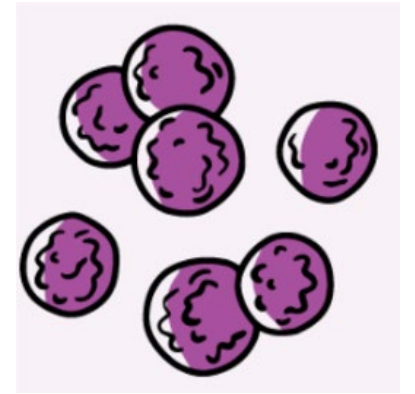
CRE



C. auris

MRSA

Methicillin-Resistant *Staphylococcus aureus*



- ▶ Staph is a very common germ or bacterium that about 1 out of every 4 people carry on their skin or in their nose, but only 2% carry MRSA
- ▶ Sometimes it can cause serious infections such as skin or wound infections, pneumonia, or infections of the blood
- ▶ MRSA is a type of staph bacteria that is resistant to certain antibiotics called beta-lactams. These antibiotics include methicillin, oxacillin, penicillin, and amoxicillin

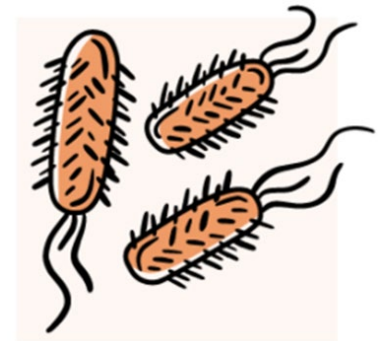
VRE



Vancomycin-Resistant *Enterococcus*

- ▶ The *Enterococcus* is a germ or bacterium that lives in the intestinal tract and in the female genital tract
- ▶ *Enterococcus* can cause infections of the urinary tract, intestines, bloodstream, or skin wounds
- ▶ Some *Enterococcus* germs are no longer killed by vancomycin and are known as vancomycin-resistant *Enterococcus*

ESBL E.COLI/K. PNEUMONIA



Extended-spectrum Beta-lactamase producing *E.coli/K. pneumoniae*

- ▶ Very common germ or bacterium that live in the gut
- ▶ Two of the most common bacteria causing infections in humans, particularly urinary tract infections (UTIs)
- ▶ ESBL-producing strains are bacteria that produce an enzyme called extended-spectrum beta-lactamase (ESBL), which makes them more resistant to antibiotics
- ▶ In many instances, a very limited group of antibiotics remain effective

CRE

Carbapenem

-Resistant



Enterobacteriales

- ▶ Well over a hundred different species
- ▶ Live in multiple environments normally, including small and large intestine of multiple species
- ▶ Many different types of Enterobacteriales can develop resistance, including *Klebsiella pneumoniae* and *Escherichia coli* (*E. coli*). These bacteria can cause infections including pneumonia, bloodstream infections, urinary tract infections, wound infections, and meningitis
- ▶ CRE are a major concern for patients in healthcare settings because they are resistant to carbapenem antibiotics, which are considered the last line of defense to treat multidrug-resistant bacterial infections. Often, high levels of antibiotic resistance in CRE leave only treatment options that are more toxic and less effective

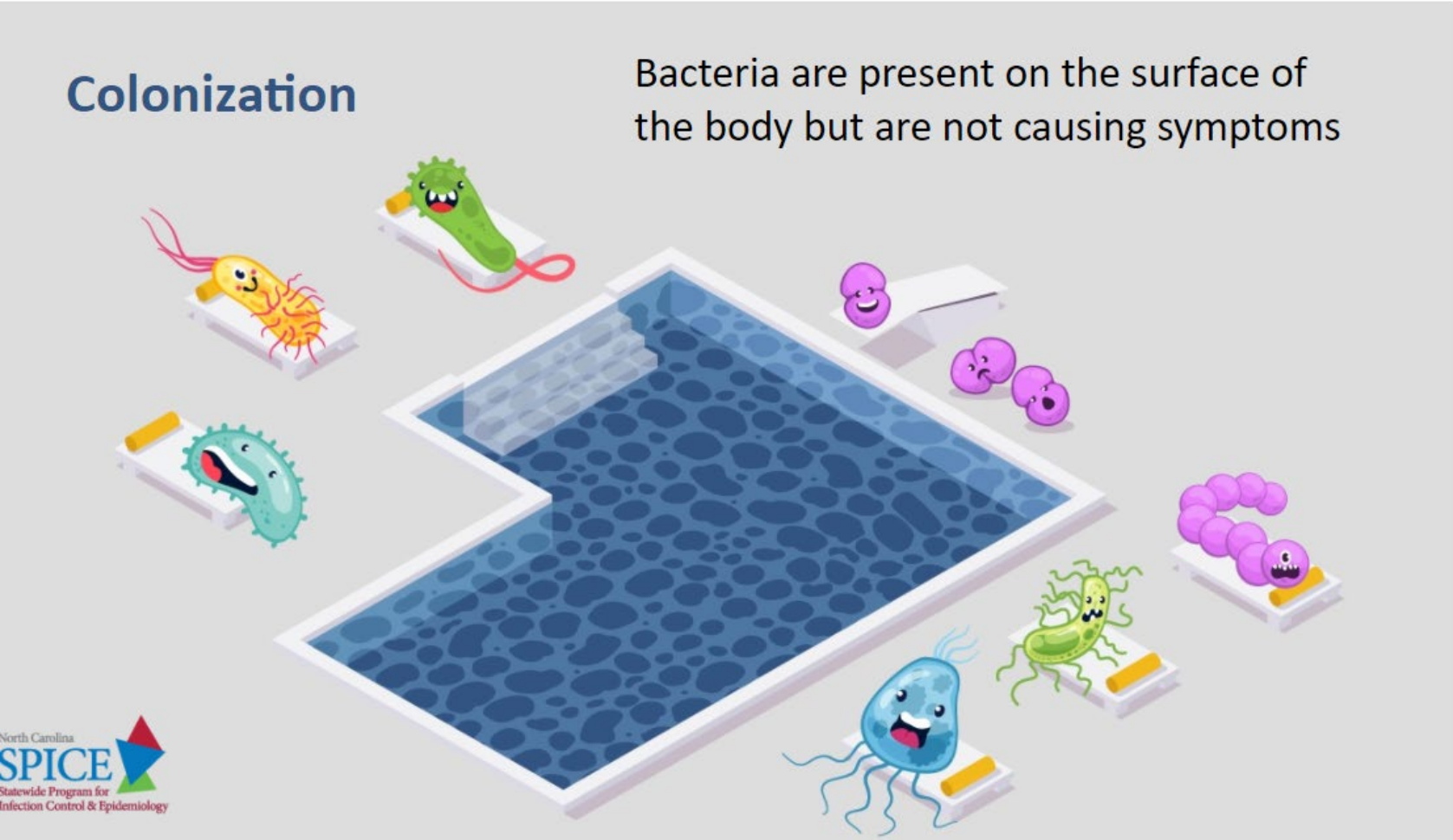
C. AURIS



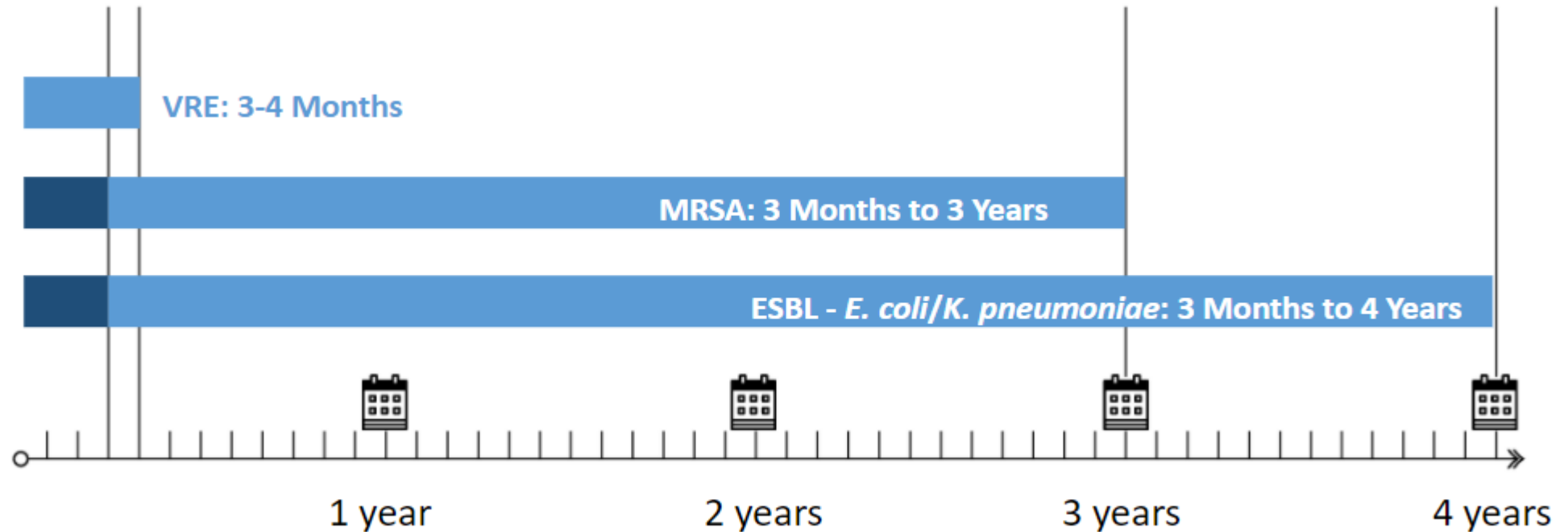
Candida auris

- ▶ Emerging fungus that presents a serious global health threat
- ▶ It is often multidrug-resistant, meaning that it is resistant to multiple antifungal drugs commonly used to treat *Candida* infections. Some strains are resistant to all three available classes of antifungals
- ▶ It is difficult to identify with standard laboratory methods
- ▶ It has caused outbreaks in healthcare settings
- ▶ *C. auris* has caused bloodstream infections, wound infections, and ear infections. It also has been isolated from respiratory and urine specimens, but it is unclear if it causes infections in the lung or bladder

COLONIZATION



COLONIZATION CAN LAST A LONG TIME



INFECTION

Infection

Bacteria invade sterile tissue or mucous membranes and cause symptoms (pus, redness, fever, etc)



HOW ARE MDROS SPREAD



Healthcare personnel hands

Environmental surfaces

Equipment



PREVENTING THE SPREAD OF MDROS

- ▶ Effective infection control policies & procedures
- ▶ Hand hygiene
 - ▶ Soap and water
 - ▶ Alcohol-based hand rub
- ▶ Standard precautions
 - ▶ Use for all, regardless of infection/colonization status
 - ▶ Use PPE when indicated based on task
- ▶ Transmission-based contact Isolation
 - ▶ Infection
 - ▶ Colonization
 - ▶ Unable to contain secretions
 - ▶ Draining wounds
- ▶ Cleaning and disinfection
 - ▶ Equipment
 - ▶ Environmental surfaces
 - ▶ High-touch areas



TRANSMISSION-BASED CONTACT PRECAUTIONS

STOP CONTACT PRECAUTIONS **ALTO**
PRECAUCIONES DE
TRANSMISIÓN POR CONTACTO

Family/Visitors should not visit if having signs or symptoms of an infection or a communicable disease. Visitation also based on facility's policy.
Los familiares y visitantes no deben visitar si tienen señales o síntomas de infección o de una enfermedad contagiosa. Las visitas también dependen de la política de la instalación.

Follow instructions below before entering room.
Antes de entrar a la habitación, siga las instrucciones a continuación.

Everyone must:

 Clean hands before entering and when leaving room.
Todos deben:
Lavarse las manos antes de entrar y antes de salir de la habitación.



All Healthcare Personnel must:
Todo el personal de atención médica debe:

 Wear gloves when entering room and remove before leaving room.
Usar guantes al entrar a la habitación y quitárselos antes de salir de la habitación.

 Wear a gown when entering room and remove before leaving.
Usar una bata al entrar a la habitación y quitársela antes de salir.

 Use patient-dedicated or single-use disposable equipment. If shared equipment is used clean and disinfect between patients.
Usar equipo desechable de un solo uso o designado al paciente. Si se utiliza equipo compartido, limpiar y desinfectar entre pacientes.

Additional PPE may be required per Standard Precautions.
Es posible que se exija utilizar equipo de protección personal adicional según las precauciones estándar.

Translated by UNC Health Interpreter Services REVISED DATE: 1/20/22

RISK FACTORS

- ▶ A variety of factors have been associated with an increased risk of Multidrug-resistant organisms:
 - ▶ Underlying illnesses
 - ▶ Presence of invasive devices (urinary catheters, IVs, etc.)
 - ▶ Recent use of antibiotics
 - ▶ Presence of wounds (pressure ulcers, surgical, etc.)
 - ▶ Decline in functional status
 - ▶ Increased intensity/longevity of nursing care



KNOWLEDGE CHECK

▶ When a Multidrug-Resistant Organism is present, grows, and multiplies but is not detected because there is no sign of illness in the patient, resident or healthcare worker, this condition is called?

1. Infection
2. Colonization
3. Disease
4. Epidemic



KNOWLEDGE CHECK

▶ Which of the following is NOT one of the most common Multidrug-Resistant Organisms?

1. MRSA
2. VRE
3. Influenza
4. ESBL- *E.coli*



KNOWLEDGE CHECK

▶ Drugs that fight infections caused by bacteria are called?

1. Narcotics
2. Non-steroidal anti-inflammatory drugs
3. Antibiotics
4. Statins



KNOWLEDGE CHECK

▶ Person-to-person spread of Multidrug-Resistant Organisms occur by?

1. Healthcare worker hands
2. Surfaces
3. Shared equipment
4. All of the above



KNOWLEDGE CHECK

▶ _____ is when a Multidrug-Resistant Organism invades body tissue and multiplies, causing signs of illness like fever, elevated white blood cell counts, purulence (pus), pneumonia, inflammation, etc.?

1. Colonization
2. Sterilization
3. Epidemic
4. Infection

RESOURCES

- ▶ <https://www.cdc.gov/fungal/candida-auris/index.html>
- ▶ <https://www.cdc.gov/hai/organisms/cre/cre-patients.html>
- ▶ <https://www.cdc.gov/infectioncontrol/guidelines/mdro/index.html>
- ▶ <https://spice.unc.edu/>
- ▶ <https://spice.unc.edu/ask-spice/>

QUESTIONS

