Life Science: The Spread of MRSA (methycillin resistant *staphylococcus aureus*) High School, 9th Grade Spring 2012

Project READI Curriculum Module

Technical Report CM #23

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PROJECT READi

inquirium

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Project READI operated as a multi-institution collaboration among the Learning Sciences Research Institute, University of Illinois at Chicago; Northern Illinois University; Northwestern University; WestEd's Strategic Literacy Initiative; and Inquirium, LLC. Project READI developed and researched interventions in collaboration with classroom teachers that were designed to improve reading comprehension through argumentation from multiple sources in literature, history, and the sciences appropriate for adolescent learners. Curriculum materials in the READI modules were developed based on enacted instruction and are intended as case examples of the READI approach to deep and meaningful disciplinary literacy and learning.

Name _____ Date _____
Teacher _____

MRSA

Interactive Notebook

Project READI, March 2012

Introduction

Over the next few weeks, we are going to be studying about a serious public health issue, an infection called MRSA. This infection has been studied by scientists for many years. The bad news is the infection can be deadly. The good news is it is almost entirely preventable IF you understand the science.

Your job, over the course of this unit, is to make sense of the science, determine the best steps to prevent the spread of the infection, and share what you have learned with your community. Your knowledge may be your community's best defense. Let's get to work!

Lesson 1: Warm-up

Individual

- What do you know, think, possibly remember or wonder about bacteria, infection, antibiotics and/or MRSA?

Pairs

- Take turns sharing your ideas for one minute each.
- Add partner's ideas to your brainstorm.

Whole class

- Share an idea you or your partner has about MRSA.
- Add peer's ideas to your brainstorm.

Connie's Story: A Nurse's Personal Experience with MRSA

The voices of patients are often missing from discussions of the impact of medical errors and adverse events. Ms. Constance Lehfeldt is a former nurse who developed a methicillin-resistant *Staphylococcus aureus* (MRSA) infection, which ultimately led to a devastating series of complications. Although the exact source of her MRSA infection remains unclear, it manifested itself after her surgery at a hospital in the Peace Health system and left her with mild speech problems and blindness in one eye. Connie's Story was produced for the Agency for Healthcare Research and Quality by editors from the University of California, San Francisco.

Video Inquiry

- As you view the video, make notes about interesting ideas from the video. Also, write the questions and connections that you form.

Pairs

- Take turns sharing your ideas and questions for one minute each.
- Add partner's ideas to your response.

Inquiry Questions

Individual

- Locate your inquiry notetaker
- Add today's date and video title to the date and source column.
- Add today's date and article titles to the date and source column.
- Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions.
- In the evidence column note the evidence from the texts that support the new ideas or spark the questions.

Lesson 2: Warm-up

Individual Reflection

- What do you know or think about the terms (pick any two word families) infect/infection, evolve/evolution or, antibiotic resistant/antibiotic resistance?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share an idea you or your partner has about these terms.
- Add peers' ideas onto your own response.

Reading Preview

Individual

Take two minutes to look over the articles ''Superbug MRSA Worries Doctors, Athletes" and "Kansas City Teen Gets MRSA from Attempted Lip Piercing, Almost Dies."

- What might be challenging about reading these two articles?
- What might be interesting about reading these two articles?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share your response or your partner's response.
- Add peers' best ideas onto your own response.

Reading Inquiry

Teacher Model

- Listen and make notes about the teacher's reading process.
- Which, if any of the reading processes below, did you notice?

Think Aloud Talk Stems

Questioning
- A question I have is …
- I wonder about …
- Could this mean …

Predicting
- I predict that …
- In the next part, I think …
- I think this is …

Picturing
- I can picture …
- I can see …

Making Connections
- This is like
- This reminds me of

Identifying a Problem
- I'm confused about …
- I'm not sure of …
- I didn't expect …

Summarizing
- So what it is saying is …
- The big idea here is …
- I think the point is …

Using Fix-Ups
- I'll re-read this
- I'll read on & check back

Pair Think Aloud

Take turns thinking aloud by paragraph for the first section.

- One partner thinks aloud. The Think Aloud Talk Stems for examples of ways to talk about your reading process.
- The other partner makes notes in the margin of the text about their partner's thoughts.

Pair Discussion

After reading discuss and respond to the prompt.

- What new words or word-uses did you encounter?
- How did you make sense of their meaning?
- Which do you have questions or uncertainty about?

Whole Class Discussion

- Share a word that you or your partner grappled with.
- Explain what you did to try to make sense of the word.
- Explain clues in the text that you used and how you used your own knowledge.
- Share your prediction about what the word means in this text.

Repeat above steps for remaining sections and the second article.

'Superbug' MRSA Worries Doctors, Athletes
Jan. 13, 2005 --

Ricky Lannetti was once the picture of health -- a big, strong college football player.

In the fall of 2003, he had led his team to a big victory, catching more passes than anyone and securing a spot in the national semifinals. But sometime after that game he caught something else.

"They didn't know what they had. They were as confused as I was," his mother, Teresa, told ABC News. "They had five different antibiotics in him, but they finally said, 'We can't handle it.'" On Dec. 6, 2003, one week after his last game, Lannetti died.

There's still a lot of mystery surrounding how Lannetti, 21, got sick in the first place and why his illness progressed so quickly. But one thing is clear: He had an infection caused by a bacteria generally found on the skin or in the nose, called MRSA, or methycillin resistant *staphylococcus aureus*.

MRSA is the kind of germ doctors have worried about for years: some call it a "superbug," a germ the usual antibiotics won't kill.

Worse, it can cause trouble quickly. What starts as a skin infection, can become a deadly pneumonia or blood or bone infection in a matter of days if not treated correctly.

Delicate Choices

Up until recently, doctors hadn't seen MRSA in healthy young people outside the hospital, said Dr. Robert Daum of University of Chicago Hospitals. "MRSA is a denizen of the hospital," he said. "It lives here."

But now, 65 percent of the staphylococcus infections coming into his emergency room in otherwise healthy kids are MRSA, he said. To him, that rate of growth is alarmingly fast -- a cause for concern.

MRSA is resistant to anywhere from 15 to 30 different antibiotics. That means when it's detected, a doctor has only a very small number of compounds at hand that are able to kill it.

Daum said he has seen some patients with MRSA that are worse off for having seen a doctor that could not recognize it. The patients were treated with regular antibiotics -- and that gave the germ more time to do damage in the body.

"We've seen a lot of kids that come in here that needed intensive care and in fact have died that have started off by being out in the community, where they get an old treatment and then come in here having failed it," he said.

Evolving Quickly

Most MRSA infections begin with a cut or a bruise, which is why some of the worst outbreaks have happened to football teams.

"I think you'd be hard-pressed right now to find a college athletic department that has not seen it in some shape or form with some of their athletes," said Ron Courson, the athletic trainer for the University of Georgia football team. Eight players on his team had MRSA infections this season.

A communal locker room, with many people in one area, can help bacteria spread, he said. "You may have athletes sharing equipment such as passing a towel from one person to the next person on the sideline."

Even the NFL has had its share of problems: players such as Kenyatta Walker of the Tampa Bay Buccanneers and Junior Seau and Charles Rodgers of the Miami Dolphins reportedly have been hospitalized with serious MRSA infections.

Daum's biggest concern is that as MRSA continues to evolve, it will become resistant to even more antibiotics.

"Bacteria are unlike us humans. We have a generation time of about 25 years. They have a generation time of 20 minutes," he said. "They can adapt pretty fast."

Daum said he is seeing a strain in the Midwest that is so severe, it has caused deaths even when the right antibiotic is used.

Source: http://abcnews.go.com/Health/Primetime/story?id=410908&page=1&singlePage=true

Kansas City Teen Gets MRSA From Attempted Lip Piercing, Almost Dies

Published May 12, 2008 / FoxNews.com

A Kansas City-area teenager who tried to pierce his lip with a needle from a first-aid kit ended up with a staph infection that almost killed him.

Zeke Wheeler of Blue Springs is recovering at Children's Mercy Hospital after several surgeries on his knees and hips to remove the drug-resistant infection called Methicillin-resistant Staphylococcus aureus infection. Now the 15-year-old high school freshman faces heart surgery, more hospitalization and a long course of antibiotics.

The boy's father — John Wheeler — said Wednesday that the boy was at home ill with flu and bronchitis on April 8 and tried to pierce his lower lip. A week later the boy felt feverish and went to an emergency room, where he was diagnosed with a viral infection.

Not until he was at Children's Mercy was he found to have MRSA. Dr. Robyn Livingston, director of Infection Control at Children's Mercy Hospital, told KCTV-5, "If MRSA gets into the blood stream, you're talking about infection on the heart, pneumonia, into the bone that may require surgical intervention." Every part of Wheeler's body is now affected, Livingston added. He's had six blood transfusions, and three knee and two hip surgeries.

Dr. Joseph Rahimian, an infectious disease specialist at St. Vincent's Hospital in New York City, said he treats about 15 cases of MRSA each week. "It's a bacteria we're seeing more and more frequently in communities and hospitals," Rahimian said. "It could be because of the increased use of antibiotics." Rahimian said he thinks Wheeler will recover, although the teenager might have some chronic consequences. "I guess there is a lesson in this," Rahimian said. "If you are getting a piercing, it should be done with someone who knows what they are doing, and it should be done with a clean, sterilized needle with someone who knows where the major vessels are to avoid injecting into an artery or vein."

— The Associated Press contributed to this report

Source: http://www.foxnews.com/story/0,2933,354696,00.html#ixzz1m0Zzjt9b

Inquiry Questions

Individual

- Locate your inquiry notetaker
- Add today's date and article titles to the date and source column.
- Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions.
- In the evidence column note the evidence from the texts that support the new ideas or spark the questions.

Pair Discussion

- Take one minute each to share your new ideas, questions and evidence about
    - the three inquiry questions
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- Discuss commonalities and differences
- Add great ideas from your partner to your own inquiry notebook

Whole Class Discussion

- Share a new idea or a new question and evidence about the inquiry questions
- Add great ideas from your peers to your own inquiry notebook

Lesson 3: Warm-up

Individual

Respond to one of the following prompts.

- Describe a real life experience when you had a lot of information but only some of it was evidence. What is the difference between information and evidence?
- What are different meanings for the word 'model?' What might the word model mean in science? What are examples of science models you have encountered?

Pairs

- Take turns sharing their ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share a response to either prompt.
- Add peers' ideas onto your own response.

Finding Evidence – How MRSA is transmitted & How infection Occurs

Pairs

- Re-read the two articles with a partner to find evidence for how MRSA is transmitted and how MRSA infections occur. Underline or highlight the evidences you find.
- Discuss how you know what counts as evidence.

Visual Representation for MRSA Transmission & Infection Model

Individual

- What kinds of visual representations might help organize the information into a model about how MRSA transmission and infection occur?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole Class

- Share ideas that you or your partner considered.
- Add peer's ideas onto your own response.

Visual Representation for MRSA Transmission & Infection Model

Small groups

- Create a visual representation of a model for depicting how MRSA transmission and infection occur.
- The next two blank pages are available for drafting your model.

Peer Review

This is your opportunity to get and give feedback to peers and help each other improve your visual models.

- Each group takes a few minutes to show and explain their visual representation.
- Listeners take a turn to share:
    - What is clear in the visual model?
    - What is unclear or misrepresented in the visual model?
    - What is missing from the visual model?
    - What does not belong in the visual model?

Written Representation for MRSA Transmission & Infection Model

Small groups

- Compose a written representation of your model explaining how MRSA transmission and infection occurs.
- The next two blank pages are available for composing a written representation of your model.

Lesson 4 - Warm Up

Individual

Respond to two of the following three prompts.

- What is one part of your MRSA transmission and infection model that you are proud of? Why?
- What was challenging about creating your model? How did you resolve the challenge?
- What is one part of your model in which you had to make a guess, assumption or inference? What was your reasoning or rationale for making the guess, assumption or inference?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share a response to either prompt.
- Add peer's ideas onto your own response.

MRSA Transmission and Infection Model Science Seminar

Small Groups

Make a poster that displays both the visual and written representations of your group's model for MRSA transmission and infection.

Science Seminar

Travel from poster to poster with your group. At each poster, read and discuss the model. Make notes for each poster about:

- What is clear about the model?
- What is unclear or misrepresented in the model?
- What is missing from the model?
- What does not belong in the model?
- What commonalities and differences do you notice?

Whole Class Discussion

Return to your tables.
Volunteers share an observation, connection, thought, question or insight about MRSA.

Inquiry Questions

Individual

- Locate your inquiry notetaker
- Add today's date and activity to the date and source column.
- Write in the interpretation column the new ideas and questions that you have about our MRSA inquiry questions? Also write any new ideas you have about the concepts:
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- Write in the evidences column the quotes that support the new ideas or spark the questions.

Pair Discussion

- Take one minute each to share your new ideas, questions and evidences about
    - the three inquiry questions
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution

- Discuss commonalities and differences
- Add great ideas from your partner to your own inquiry notebook

Whole Class Discussion

- Share a new idea or a new question and evidence about the inquiry questions
- Add great ideas from your peers to your own inquiry notebook

Lesson 5 – Warm Up

Individual

Respond to one of the following two prompts.

- What is a word, that for you, the meaning has changed over time? How did it change and why? A response might be like: *I used to think that ____ meant but now I know that it means ____ because ___.*
- Have you experienced learning a new word and then noticing the same word frequently? What was the word? When did you learn it? Where do you then recall noticing it? How do you account for the phenomena?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share an idea you or your partner has about word learning.

Survival Words Reading Inquiry

Individual

- Preview *Superbug, Super-Fast Evolution* and underline words that are new to you or are familiar but might be used in an unfamiliar way in this text.
- Put a star next to any of these words that you will need to understand in order to understand the main ideas of the text. These are your survival words for this text.

Pairs

- Take turns sharing your own survival words.
- Discuss why you picked the word:
    - Is it an unfamiliar word or a familiar word used in an unfamiliar way?
    - What clues in the text suggest that it will be important to clarify the words meaning to understand the main ideas of the text?

Whole Class

- Share survival words and reasons for picking them.
- Identify reading strategies for deciding which words are worth understanding and add them to our reading strategies list.

Pairs

- Take turns thinking aloud by paragraph with *Superbug, Super-Fast Evolution.*
- One partner thinks aloud and the other partner makes notes in the margin about their partner's thoughts.
- As you Think Aloud, try to clarify the survival words.
- After reading, collaborate to clarify the meanings of any survival words not yet clarified.

Whole Class

- Share and discuss how we clarified survival words and what they mean in this text.
- Add new or revised reading strategies to our class Reading Strategies list.
- Add new words to our MRSA word wall.

Repeat the Survival Words Reading Inquiry with the next text, *Antibiotic resistance.*

Superbug, Super-fast Evolution

April 2008

Fascination with tiny microbes bearing long, difficult-to-pronounce names is often reserved for biology classrooms — unless of course the bug in question threatens human health. MRSA (methicillin-resistant *Staphylococcus aureus*) now contributes to more US deaths than does HIV, and as its threat level has risen, so has the attention lavished on it by the media. At this point, almost any move the bug makes is likely to show up in your local paper. Last month saw reporting on studies of hospital screening for MRSA (which came up with conflicting results), stories on MRSA outbreaks (involving both real and false alarms), and media flurries over the finding that humans and their pets can share the infection with one another. Why is this bug so frightening? The answer is an evolutionary one.

Where's the evolution?

MRSA is resistant not only to the antibiotic methicillin, but also to whole other suites of our drugs, making it very difficult to treat and, occasionally, deadly. Modern strains of MRSA did not, however, show up out of the blue. In the early 1940s, when penicillin was first used to treat bacterial infections, penicillin-resistant strains of *S. aureus* were unknown — but by the 1950s, they were common in hospitals. Methicillin was introduced in 1961 to treat these resistant strains, and within one year, doctors had encountered methicillin-resistant *S. aureus*. Today, we have strains of MRSA that simultaneously resist a laundry list of different antibiotics, including vancomycin — often considered our last line of antibacterial defense.

How did *S. aureus* morph from a minor skin infection to a terror? When the media report on MRSA and other drug resistant pathogens, they often say that such pathogens have recently "emerged" — that they've "developed" resistance or "learned" to evade our drugs. In fact, it's more accurate to say that these bugs have *evolved* resistance. It's particularly ironic that newspapers might shy away from describing bacterial evolution as such because, when it comes to evolution, bacteria have most of the rest of us beat.

Source: Excerpt from "Superbug, super-fast evolution." Copyright 2011 by The University of California Museum of Paleontology, Berkeley, and the Regents of the University of California

Antibiotic / Antimicrobial Resistance

Antibiotics and similar drugs, together called antimicrobial agents, have been used for the last 70 years to treat patients who have infectious diseases. Since the 1940s, these drugs have greatly reduced illness and death from infectious diseases. Antibiotic use has been beneficial and, when prescribed and taken correctly, their value in patient care is enormous. However, these drugs have been used so widely and for so long that the infectious organisms the antibiotics are designed to kill have adapted to them, making the drugs less effective. People infected with antimicrobial-resistant organisms are more likely to have longer, more expensive hospital stays, and may be more likely to die as a result of the infection.

Source: http://www.cdc.gov/drugresistance/index.html

Inquiry Questions

Individual

- Locate your inquiry notetaker
- Add today's date and article titles to the date and source column.
- Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions. Also add any new ideas that you have about the concepts:
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- In the evidence column note the evidence from the texts that support the new ideas or spark the questions.

Pair

- Take one minute each to share your new ideas, questions and evidence about
    - the three inquiry questions
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- Discuss commonalities and differences
- Add great ideas from your partner to your own inquiry notebook

Whole Class Discussion

- Share a new idea or a new question and evidence about the inquiry questions
- Add great ideas from your peers to your own inquiry notebook

Lesson 6 – Warm Up

Individual

Take two minutes to look over the next three texts: Comparison of Estimated Death in U.S. in 2005, MRSA History, and Resistance to the antibiotic Vancomycin.

- What might be challenging about reading these three texts?
- What might be interesting about reading these three texts?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share your response or your partner's response.
- Add peers' ideas onto your own response.

Visual Texts Reading Inquiry

Teacher Model

- Listen and make notes about the teacher's reading process.

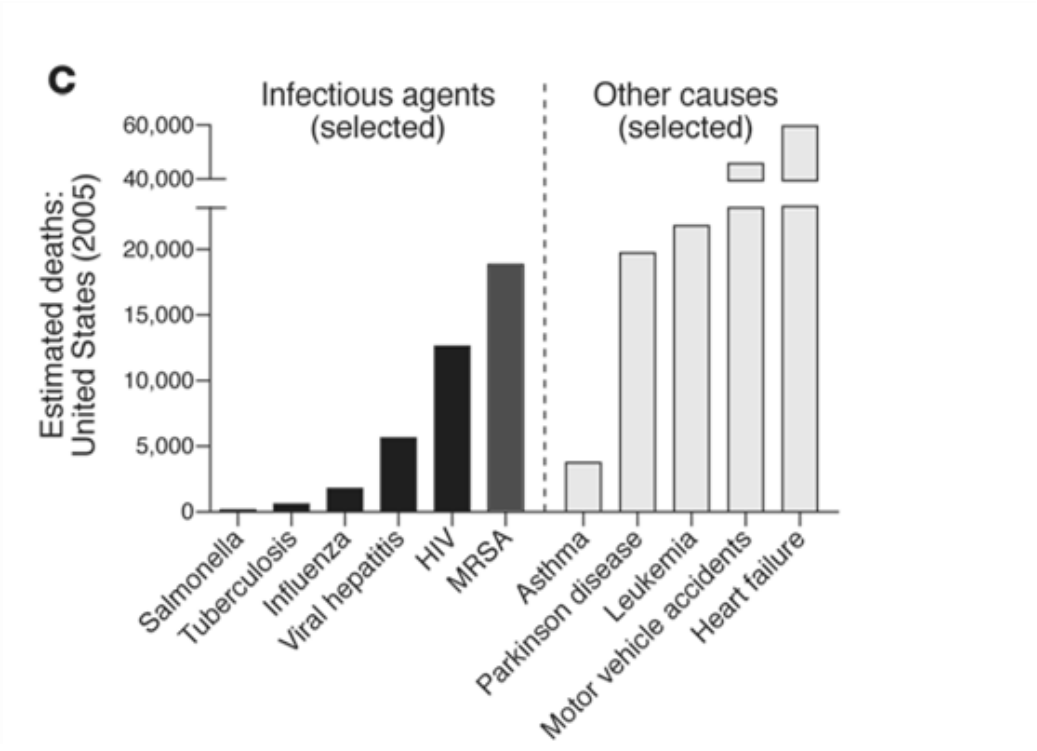
Pair Think Aloud

- Take turns thinking aloud with Comparison of Estimated Death in U.S. in 2005.
- One partner thinks aloud and the other partner makes notes in the margin about their partner's thoughts.

Whole Class Discussion

- What did you notice about your reading process with this text? What reading challenges did you or your partner encounter and how did you respond to the reading challenge? How did you read the visual?
- What questions, connections, or ah-ha's do you have from your reading?
- What should we add to our class reading strategy list and word walls?
- What new ideas about the concepts below can we add to our concept building posters?
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution

Comparison of Estimated Death in U.S. in 2005



(**C**) Comparison of estimated deaths in the United States in 2005 due to individual infectious agents or other causes. Data are CDC estimates from National Vital Statistics Reports (12) and Klevens et al. (11). Deaths associated with MRSA infection are based on the estimated number of in-hospital deaths rather than attributable mortality, whereas data for all other causes of mortality are based on US Standard Certificate of Death. Note also that mortality due to MSSA is not included, and thus estimated mortality associated with all *S. aureus* infections is not shown.

Source: http://www.jci.org/articles/view/38226, Frank R. DeLeo, Henry F. Chambers, *J. Clin. Invest.* 2009; **119**(9):2464

MRSA History

Late 1880s
Scottish surgeon Alexander Ogston identifies a bacterium, *Staphylococcus aureus*.

1928
British scientist Alexander Fleming discovers the first antibiotic, penicillin.

1941
Penicillin becomes available in the United States and England. The first penicillin-resistant Staphylococcus aureus is reported a short time later.

Late 1940s
One-quarter of *Staphylococcus aureus* bacteria in hospitals are penicillin-resistant.

1958
Vancomycin, still considered an antibiotic of last resort, is introduced.

1959
The antibiotic methicillin is introduced.

1961
Doctors find the first cases of methicillin-resistant *Staphylococcus aureus* (MRSA).

1960-1967
Infrequent hospital outbreaks of MRSA in Western Europe and Australia

1968
First hospital outbreak of MRSA in the United States at the Boston City Hospital, Massachusetts

1968–mid 1990s
Percent of *Staphylococcus aureus* infections in hospitalized patients that were caused by MRSA increased slowly but steadily.

1982
Large outbreak of MRSA infections among intravenous drug users in Detroit, Michigan

Late 1980s–1990s
Outbreaks of MRSA noted in Australia among Aboriginal populations with no exposure to hospitals.

1998–2008: The CA-MRSA Epidemic Decade
While rates of HA-MRSA (Hospital Acquired) infection remained stable, rates of CA-MRSA (Community Acquired) increased.

Mid-1990s
Scattered reports of CA-MRSA infections in children in the United States.

1999
First reports of healthy, young children dying of severe MRSA infections

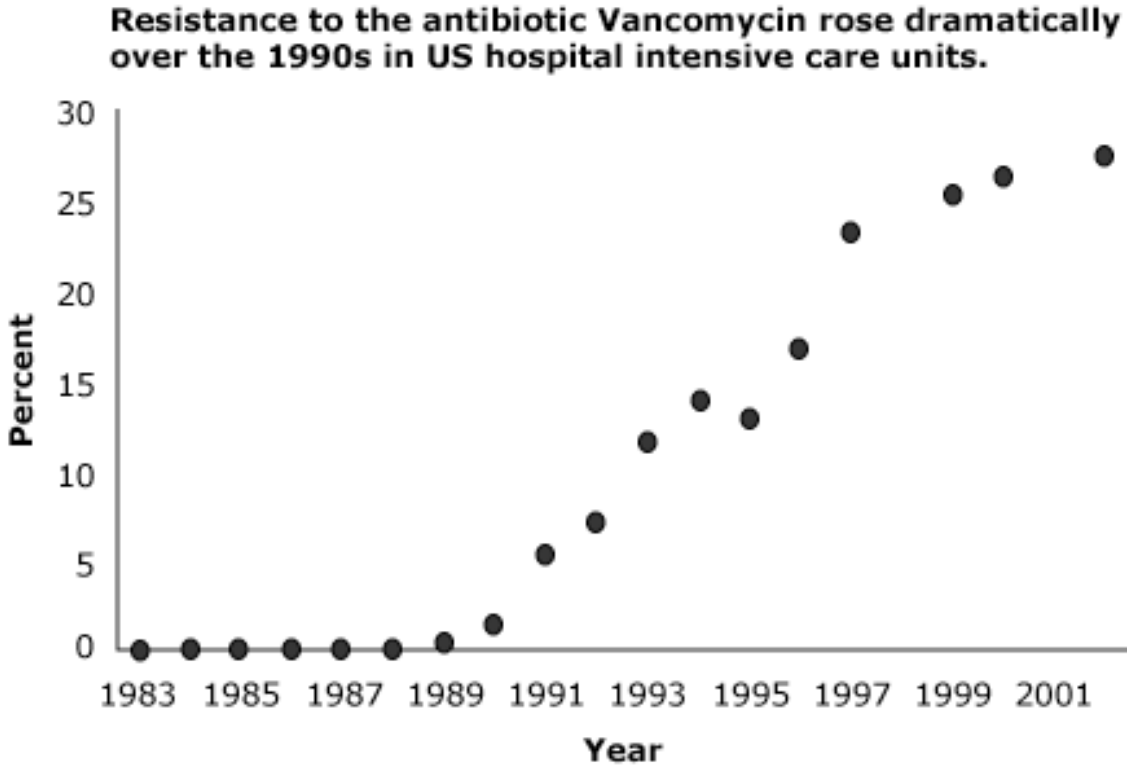
2002
Doctors find vancomycin-resistant Staphylococcus aureus in the United States.

2005
CA-MRSA risk factors identified to date include: athletes, military recruits, incarcerated people, emergency room patients, urban children, HIV patients, men who have sex with men, indigenous populations.

Today
Over 95% of *Staphylococcus aureus* worldwide is penicillin-resistant and 60% is methicillin-resistant.

Sources: http://mrsa-research-center.bsd.uchicago.edu/timeline.html
http://articles.latimes.com/2006/feb/26/science/sci-staph26/3

Resistance to Vancomycin



Excerpted from "Battling bacterial evolution: The work of Carl Bergstrom. " Copyright 2011 by The University of California Museum of Paleontology, Berkeley, and the Regents of the University of California

Inquiry Questions

Individual

- Locate your inquiry notetaker
- Add today's date and article titles to the date and source column.
- Write in the interpretation column the new ideas and questions that you have about our MRSA inquiry questions? Also write any new ideas you have about the concepts:
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- Write in the evidences column the quotes that support the new ideas or spark the questions.

Pair Discussion

- Take one minute each to share your new ideas, questions and evidences about
    - the three inquiry questions
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- Discuss commonalities and differences
- Add great ideas from your partner to your own inquiry notebook

Whole Class Discussion

- Share a new idea or a new question and evidence about the inquiry questions
- Add great ideas from your peers to your own inquiry notebook

Lesson 7 – Warm Up

Individual

- Describe a problem you have encountered; for example when you had a huge amount of homework due on the same day.
- How did you size-up the problem?
- What kinds of information would help you decide whether to ignore it, worry about it or take action? Why?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share an idea you or your partner had for sizing-up a problem.

Kinds of Information (Kinds of Evidence)	Why it was important (Warrants)

Sizing-up MRSA Brainstorm

Individual

- View Contagion trailer.
- Note the kinds of information the characters used to size up the virus in the movie trailer.

Whole Class

- Share a kind of information that the characters used to size-up the virus in the trailer for Contagion.

Individual

- How might you size-up MRSA?
- What kinds of information would help you decide whether to ignore MRSA, worry about it or take action? Why

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Sizing-up MRSA Brainstorm

Whole class

- Share an idea you or your partner has about sizing-up MRSA.
- Add kinds of information and why it is important the organizer below.

Kinds of Information (Kinds of Evidence)	Why it is important (Warrants)

Identifying Evidence for Sizing-up MRSA

Small groups

- Form two sets of pairs per group
- In pairs review your inquiry notetaker entries about relevance of MRSA, and reread one-half the texts in pairs to locate and note evidence useful for sizing-up MRSA.
    - "Comparison of Estimated Death in U.S. in 2005"
    - "MRSA History"
    - "Resistance to the antibiotic Vancomycin"
    - "Superbug' MRSA Worries Doctors, Athletes"
    - "Kansas City Teen Gets MRSA From Attempted Lip Piercing, Almost Dies"

- As group confirm what information is important for sizing-up MRSA.

Lesson 8 – Warm Up

Individual

- What kinds of visual representations might help organize the evidence that is important for sizing-up MRSA?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole Class

- Share ideas that you or your partner considered.
- Add peers' ideas onto your own response

Visual Representation of Evidence for Sizing-up MRSA

Small groups

- Create a visual representation of the evidence that is important for sizing-up MRSA.
- The next two blank pages are available for drafting your visual representation.

Peer Review

This is your opportunity to get and give feedback with peers to help each other improve your visual representation of the evidence.

- Each group takes a few minutes to show and explain your visual representation.
- Listeners take a turn to share:
    - What is clear?
    - What is unclear or misrepresented?
    - What is missing?
    - What does not belong?

Visual Representation of Evidence for Sizing-up MRSA

Visual Representation of Evidence for Sizing-up MRSA

Sizing up MRSA Ourselves

Individually

- Write a scientific recommendation to yourself. Personally, for you, what level of response is appropriate for MRSA? Why? On what evidence and warrants did you base your recommendation?

Small Groups

- Take 1 minute each to share your own personal scientific recommendation and the evidence and warrants you valued.
- As a group, develop a consensus scientific recommendation. Make sure you:
    - Support your recommendation with evidence, and
    - Have warrants for why the evidence is important.
- The next page is available for composing your consensus scientific recommendation.

Sizing up MRSA Ourselves

Sizing up MRSA Ourselves

Lesson 9 – Warm Up

Individual

Respond to two of the following three prompts.

- What is one part of your work on sizing up MRSA that you are proud of? Why?
- What was challenging about organizing the evidence or writing the recommendation? How did you resolve the challenge?

Pairs

- Take turns sharing their ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share a response to either prompt.
- Add peers' ideas onto your own response.

Sizing-up MRSA Science Seminar

Small Groups

Make a poster that displays both the visual representation of the evidence for sizing-up MRSA and written representations of your group's consensus scientific recommendation.

Science Seminar

Travel from poster to poster with your group. At each poster, read and discuss the model. Make notes for each poster about:

- What is clear or unclear?
- What is unclear or misrepresented?
- What is missing?
- What is does not belong?
- What commonalities and differences do you notice?

Whole Class Discussion

Return to your tables.
Volunteers share an observation, connection, thought, question or insight about posters they read.

Inquiry Questions

Individual

- Locate your inquiry notetaker
- Add today's date and activity (Sizing-up MRSA science seminar) to the date and source column.
- Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions. Also add any new ideas that you have about the concepts:
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- In the evidence column note the evidence from the texts that support the new ideas or spark the questions.

Pair Discussion

- Take one minute each to share your new ideas, questions and evidence about
    - the three inquiry questions
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- Discuss commonalities and differences
- Add great ideas from your partner to your own inquiry notebook

Whole Class Discussion

- Share a new idea or a new question and evidence about the inquiry questions
- Add great ideas from your peers to your own inquiry notebook

Lesson 10 – Warm Up

Individual

Respond to the following prompts.

MRSA is on the increase in the community and MRSA causes serious disease. But what caused *Staphylococcus aureus* (SA) to become methicillin-resistant *Staphylococcus aureus* (MRSA).

- What do you know, think or wonder about the how SA became MRSA?
- Why might it be important to know how SA became MRSA?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share your response or your partner's response.
- Add peers' ideas onto your own response.

Reading Preview

Individual

Take two minutes to look over the next two texts: *Battling Bacterial Evolution: the Work of Carl Bergstrom*, and *Modification by Natural Selection* (or the textbook excerpt identified by your teacher).

- What might be interesting about reading these texts?
- What might be challenging about reading these texts?
- What is one thing you can do while you read to handle the challenge?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share your response or your partner's response.
- Add peers' ideas onto your own response.

Science Model Reading Inquiry

Teacher Model

- Listen and make notes about the teacher's reading process.

Pair Think Aloud

- Take turns thinking aloud with *Battling Bacterial Evolution*.
- One partner thinks aloud and the other partner makes notes in the margin about their partner's thoughts.

Whole Class Discussion

- What did you notice about your reading process with this text? What reading challenges did you or your partner encounter and how did you respond to the reading challenge? How did you read the visual?
- What questions, connections, or ah-ha's do you have from your reading?
- What should we add to our class reading strategy list and word walls?
- What new ideas about the concepts below can we add to our concept building posters?
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution

Repeat Pair Think Aloud and whole class discussion with next text.

Battling Bacterial Evolution: The Work of Carl Bergstrom

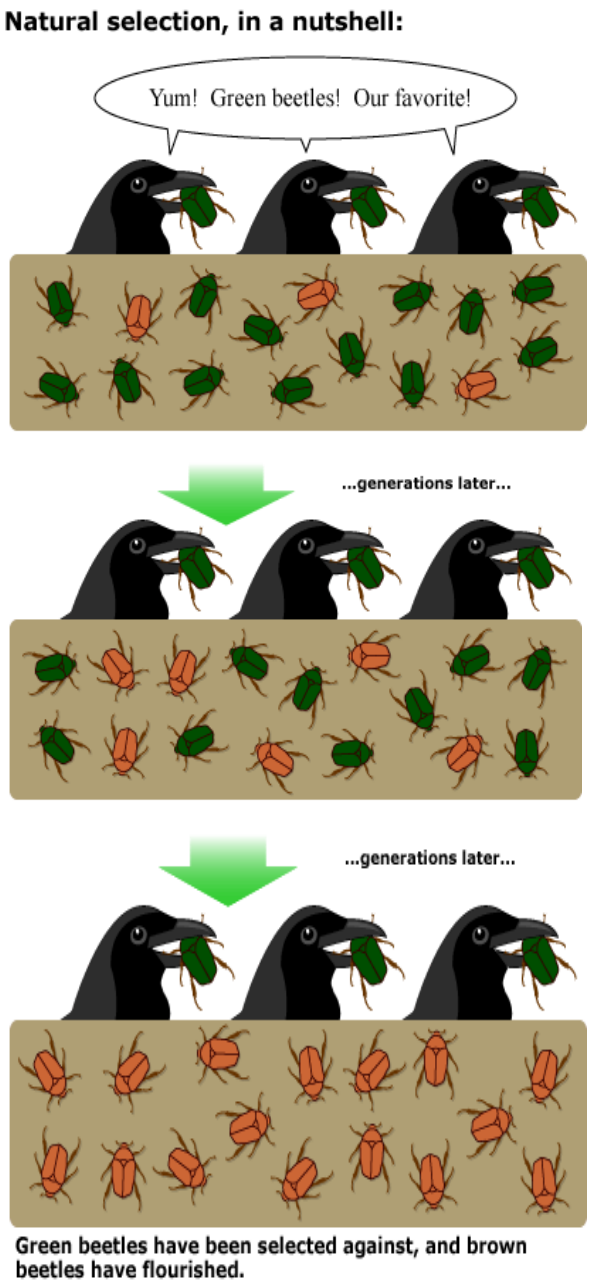
Dr. Carl Bergstrom manages evolution. From his laboratory at the University of Washington, Carl figures out how to control the evolutionary future of microbe populations, nudging them towards particular destinies and away from others. His laboratory does not look like a traditional biology lab; rather than test tubes or microscopes or Petri dishes, the rooms are full of computers, whiteboards, books, and coffee machines.

Hooked on natural selection

Carl had always been interested in biology but got hooked on evolution after encountering Darwin's basic idea of natural selection. The concept is simple, but incredibly powerful…

Natural selection is simply the logical result of four features of living systems:

- **variation** - individuals in a population vary from one another
- **inheritance** - parents pass on their traits to their offspring genetically
- **selection** - some variants reproduce more than others
- **time** - successful variations accumulate over many generations



Source: Excerpt from "Battling bacterial evolution: The work of Carl Bergstrom. " Copyright 2011 by The University of California Museum of Paleontology, Berkeley, and the Regents of the University of California

Modification by Natural Selection

Darwin proposed that the environment may affect individual organisms in a population in different ways because individuals in a species are not identical. Some organisms have traits that make them better able to cope with their environment. Organisms that have a greater number of these favorable traits tend to leave more offspring than organisms with fewer beneficial traits. Darwin called the different degrees of successful reproduction among organisms in a population natural selection.

If a trait both increases the reproductive success of an organism *and* is inherited, then that trait will tend to be passed on to many offspring. A population of organisms **adapt** to their environment as their proportion of genes for favorable traits increases. The resulting change in the genetic makeup of a population is evolution. In an evolving population, a single organism's genetic contribution to the next generation is termed **fitness.** Thus, an individual with high fitness is well adapted to its environment and reproduces more successfully than an individual with low fitness.

Bear in mind that natural selection is not an active process. Organisms do not purposefully acquire traits that they need, although it may seem that this is true. The environment "selects" the traits that will increase in a population. The kinds of traits that are favorable depend on the demands of the environment. An organism may be able to run fast, or it may be strong or have coloring that acts as camouflage from predators. Traits that are favorable for some organisms in some environments are not necessarily favorable for all organisms or all environments. For example, the large body size of large mammals such as the elephant would not be beneficial to a species of flying birds if size prevented flight. A favorable trait is said to give the organism that has it an **adaptive advantage.**

Selection conditions change as the demands of the environment change. For example, a significant change in climate or available food can cause rapid evolutionary change as populations adapt to the change. If the environmental change is too extreme, however, populations cannot adapt quickly enough and they become extinct.

Excerpted from MODERN BIOLOGY page 287

Inquiry Questions

Individual

- Locate your inquiry notetaker
- Add today's date and article titles to the date and source column.
- Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions. Also add any new ideas that you have about the concepts:
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- In the evidence column note the evidence from the texts that support the new ideas or spark the questions.

Pair Discussion

- Take one minute each to share your new ideas, questions and evidence about
    - the three inquiry questions
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- Discuss commonalities and differences
- Add great ideas from your partner to your own inquiry notebook

Whole Class Discussion

- Share a new idea or a new question and evidence about the inquiry questions
- Add great ideas from your peers to your own inquiry notebook

Lesson 11 – Warm Up

Individual

Take two minutes to look over the next two texts: *Natural Selection and Antibiotic Resistance*, and *Growth and Reproduction*.

- What might be interesting about reading these texts?
- What might be challenging about reading these texts?
- What is one thing you can do while you read to handle the challenge?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share your response or your partner's response.
- Add peers' ideas onto your own response.

Reading Inquiry

Teacher Model

- Listen and make notes about the teacher's reading process.

Pair Think Aloud

- Take turns thinking aloud with *Growth and Reproduction*.
- One partner thinks aloud and the other partner makes notes in the margin about their partner's thoughts.

Whole Class Discussion

- What did you notice about your reading process with this text? What reading challenges did you or your partner encounter and how did you respond to the reading challenge? What images did you form as you read? How did forming the visual help?
- What questions, connections, or ah-ha's do you have from your reading?
- What should we add to our class reading strategy list and word walls?
- What new ideas about the concepts below can we add to our concept building posters?
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution

Repeat process above for *Natural Selection and Antibiotic Resistance*

Growth and Reproduction

Bacterial cells grow by a process called binary fission: One cell doubles in size and splits in half to produce two identical daughter cells. These daughter cells can then double in size again to produce four sibling cells and these to produce eight, and so on. The time it takes for a bacterial cell to grow and divide in two is called the doubling time. When nutrients are plentiful, the doubling time of some bacterial species can be as short as twenty minutes. However, most bacterial species show a doubling time between one and four hours. A single bacterial cell with a one-hour doubling time will produce over 1 million offspring within twenty hours. If left unchecked, a single E. coli bacterium replicating once every twenty minutes could replicate to equal the mass of Earth in twenty-four hours. The enormous increase in cell numbers that accompanies this exponential growth provides these simple unicellular organisms with an incredible growth advantage over other unicellular or multicellular organisms.

Source: http://www.biologyreference.com/Ar-Bi/Bacterial-Cell.html#ixzz1RG7ByBLw

Natural Selection and Antibiotic Resistance

Natural selection can operate in any population, but Carl focuses much of his work on bacterial populations that impact public health… Carl's work tackles the very real problem of the evolution of antibiotic resistance by bacterial populations in hospitals.

Antibiotics, such as penicillin, are drugs that kill or prevent the growth of bacteria. When antibiotics were first discovered, they seemed to represent a miracle cure for human diseases like pneumonia, typhoid, bubonic plague, and gonorrhea. However, almost immediately after the introduction of antibiotics, bacteria began to up the stakes — resistant strains of bacteria soon evolved that could grow even in the presence of a particular antibiotic, rendering our drugs ineffective in battling these resistant infections.

How exactly does antibiotic resistance evolve? How have such small and simple organisms managed to repeatedly outpace our drugs? The process is quite simply evolution by natural selection.

Bacteria are great evolvers for many reasons. For example, their short generation times and large population sizes boost the rate at which they can evolve.

Source: Excerpt from “Battling bacterial evolution: The work of Carl Bergstrom. “ Copyright 2011 by The University of California Museum of Paleontology, Berkeley, and the Regents of the University of California

Inquiry Questions

Individual

- Locate your inquiry notetaker
- Add today's date and article titles to the date and source column.
- Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions. Also add any new ideas that you have about the concepts:
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- In the evidence column note the evidence from the texts that support the new ideas or spark the questions.

Pair Discussion

- Take one minute each to share your new ideas, questions and evidence about
    - the three inquiry questions
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- Discuss commonalities and differences
- Add great ideas from your partner to your own inquiry notebook

Whole Class Discussion

- Share a new idea or a new question and evidence about the inquiry questions
- Add great ideas from your peers to your own inquiry notebook

Identifying Evidence – How SA became MRSA

Small groups

- Form groups and two sets of pairs in each group
- In pairs review your Inquiry Notetaker, and reread one-half of the texts to locate and note evidence about how SA became MRSA.
    - The Work of Carl Bergstrom
    - Modification by Natural Selection
    - "Natural Selection and Antibiotic Resistance, and Growth and Reproduction"
    - "Comparison of Estimated Death in U.S. in 2005"
    - "MRSA History"
    - "Resistance to the antibiotic Vancomycin"
    - "Superbug' MRSA Worries Doctors, Athletes"
    - "Kansas City Teen Gets MRSA From Attempted Lip Piercing, Almost Dies"

- As group confirm what information is important for understanding how SA became MRSA.

Lesson 12 – Warm Up

Individual

- What kinds of visual representations might help organize the information into a model explaining how SA became MRSA?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole Class

- Share ideas that you or your partner considered.
- Add peer's ideas onto your own response.

Visual Model of How SA became MRSA

Small groups

- Create a visual representation of a model explaining how SA became MRSA.
- The next two blank pages are available for drafting your model.

Peer Review

This is your opportunity to get and give feedback to peers and help each other improve your visual models.

- Each group takes a few minutes to show and explain their visual representation.
- Listeners take a turn to share:
    - What is clear in the visual model?
    - What is unclear or misrepresented in the visual model?
    - What is missing from the visual model?
    - What does not belong in the visual model?

Written Representation for Model of how SA became MRSA

Small groups

- Compose a written representation of your model explaining how SA became MRSA.
- The next two blank pages are available for composing a written representation of your model.

Lesson 13 – Warm Up

Individual

Respond to two of the following three prompts.

- What is one part of your work creating a model explaining how SA became MRSA that you are proud of? Why?
- What was challenging about creating the model?
- How did you resolve the challenge?

Pairs

- Take turns sharing their ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share a response to either prompt.
- Add peers' ideas onto your own response.

How SA became MRSA Science Seminar

Small Groups

Make a poster that displays both the visual and written representations of your group's model explaining how SA became MRSA.

Science Seminar

Travel from poster to poster with your group. At each poster, read and discuss the model. Make notes for each poster about:

- What is clear or unclear?
- What is unclear or misrepresented?
- What is missing?
- What is does not belong?
- What commonalities and differences do you notice?

Whole Class Discussion

Return to your tables.
Volunteers share an observation, connection, thought, question or insight about posters they read.

Inquiry Questions

Individual

- Locate your inquiry notetaker
- Add today's date and activity (How SA became MRSA) to the date and source column.
- Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions. Also add any new ideas that you have about the concepts:
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- In the evidence column note the evidence from the texts that support the new ideas or spark the questions.

Pair Discussion

- Take one minute each to share your new ideas, questions and evidence about
    - the three inquiry questions
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- Discuss commonalities and differences
- Add great ideas from your partner to your own inquiry notebook

Whole Class Discussion

- Share a new idea or a new question and evidence about the inquiry questions
- Add great ideas from your peers to your own inquiry notebook

Lesson 14 – Warm Up

Individual

Respond to the following prompts.

MRSA is on the increase in the community and MRSA causes serious disease. But what caused Hospital Acquired methicillin-resistant *Staphylococcus aureus* (HA-MRSA) to become Community Acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA).

- What do you know, think or wonder about the how HA-MRSA became CA-MRSA?
- Why might it be important to know how HA-MRSA became CA-MRSA?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share your response or your partner's response.
- Add peers' ideas onto your own response.

Reading Preview

Individual

Take two minutes to look over the next three texts: *Microbes and You*, *How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?*, and *Wash your Hands*.

- What might be interesting about reading these texts?
- What might be challenging about reading these texts?
- What is one thing you can do while you read to handle the challenge?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share your response or your partner's response.
- Add peers' ideas onto your own response.

Reading Inquiry

Teacher Model

- Listen and make notes about the teacher's reading process and Talking to the Text.

Individual

- Talk to the Text on *Microbes and You*.

Pair s

- Take turns sharing your Talking to the Text comments
- Work together to resolve reading challenges

Whole Class Discussion

- What did you notice about your reading process with this text? What reading challenges did you or your partner encounter and how did you respond to the reading challenge? How did you read the visual?
- What questions, connections, or ah-ha's do you have from your reading?
- What should we add to our class reading strategy list and word walls?
- What new ideas about the concepts below can we add to our concept building posters?
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution

Repeat process above for the final two texts

- *How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?*,
- *Wash your Hands*

Microbes and You

By David Oliver

You are covered in microorganisms! In fact, there are approximately 10 times as many prokaryotic cells (mainly bacteria) associated with your body than there are eukaryotic cells, but this is a good thing.

Microbes that colonize the human body during birth or shortly thereafter, remaining throughout life, are referred to as normal flora [1-2]. Normal flora can be found in many sites of the human body including the skin (especially the moist areas, such as the groin and between the toes), respiratory tract (particularly the nose), urinary tract, and the digestive tract (primarily the mouth and the colon). On the other hand, areas of the body such as the brain, the circulatory system and the lungs are intended to remain sterile (microbe free).

The human body provides many unique environments for different bacterial communities to live. In this context, scientists refer to the human body as the host. A positive host-microbe relationship is usually described as either mutualistic or commensalistic. In mutualism both the host and the microbe benefit. Which is in contrast to commensalisms, where one partner of the relationship benefits (usually the microbe) and the other partner (usually the host) is neither benefited nor harmed. In many cases it may be difficult to establish whether a particular host-microbe relationship should be considered mutualistic or commensalistic, since scientists are only beginning to understand the role of normal flora in human health. In other words, individual microbes may be carrying out important functions within our bodies that we have not yet discovered. Just as host-microbe relationships can be positive or neutral, they can also be negative. Such a host-microbe relationship is usually described as parasitic or pathogenic. In a parasitic relationship the microbe benefits at the expense of the host and similarly in a pathogenic relationship the microbe causes damage to the host. In both cases the cost to the host can vary from slight to fatal.

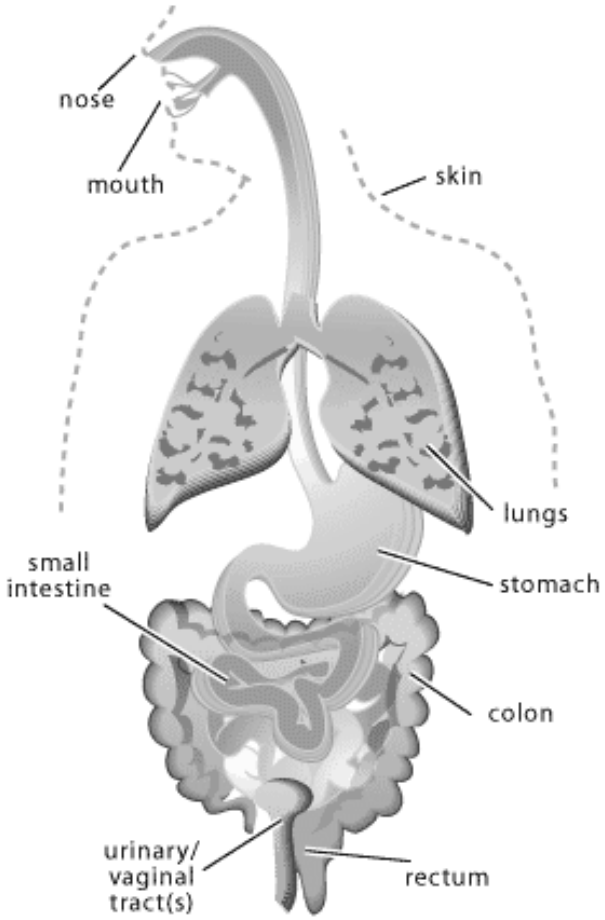


Figure 1: Location of normal microbial flora. Each of these areas of the body contain their own microenvironments and various inhabitants of microbes

Whether a host-microbe relationship is "positive" or "negative" depends on many factors. And in most cases the relationship will actually remain positive. The host provides a niche and nutrition for the colonizing microbe and the microbe occupies a space that a potential parasite or pathogen might otherwise colonize. In these cases microbial communities may even aid in digestion or synthesize nutrients for the host. However, life is not always perfect, and in certain situations good-standing members of your normal flora can cause disease or invading pathogens can displace them. The result will be disease.

Source: Excerpted from The Science Creative Quarterly, 8/2003, *Microbes and You,* http://www.scq.ubc.ca/microbes-and-you-normal-flora/

How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?

How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?

Posted 08.22.2002 at 11:43 AM 2 Comments

Art Dekenipp
Alvin, Texas

The answer is probably not what you want to hear: Microbes can live on household surfaces for hundreds of years. The good news, however, is that most don't. Some well-known viruses, like HIV, live only a few seconds.

Microbes, of course, are everywhere. Each square centimeter of skin alone harbors about 100,000 bacteria. And a single sneeze can spray droplets infested with bacteria and viruses as far as 3 feet. The microbial life span depends on many factors, says Philip Tierno, director of microbiology and diagnostic immunology at the New York University School of Medicine. Because viruses must invade cells of a living host to reproduce, their life spans outside are generally shorter than that of bacteria, which reproduce on their own. Although viruses can survive outside a host on household surfaces, their ability to duplicate themselves is compromised-shortening the virus's life span.

Humidity also makes a difference; no bacteria or virus can live on dry surfaces with a humidity of less than 10 percent. Any sort of nutrients-food particles, skin cells, blood, mucus-helps microbes thrive, which is why your kitchen sponge is a breeding ground.

Bacteria called mesophiles, such as the tuberculosis-causing Mycobacterium tuberculosis, survive best at room temperature and are likely to thrive longer than cold-loving psychrophiles or heat-loving thermophiles. According to Tierno, at room temperature and normal humidity, Escherichia coli (E. coli), a bacteria found in ground beef that causes food poisoning, can live for a few hours to a day. The calicivirus, the culprit of the stomach flu, lives for days or weeks, while HIV dies nearly instantly upon exposure to sunlight. Other microbes form exoskeleton-like spores as a defense mechanism, like the bacteria *Staphylococcus aureus*, which is responsible for toxic shock syndrome, food poisoning, and wound infections. In this way, they can withstand temperature and humidity extremes. Tierno says this bacterial spore can survive for weeks on dry clothing using sloughed skin cells for food. The Bacillus anthracis, the anthrax bacteria, can also form spores and survive tens to hundreds of years.

Worried that your home is a hospitable habitat? Tierno says simple hand washing can greatly reduce your risk of picking up germs. Using a disinfectant on high-traffic surfaces-doorknobs, kitchen counters, and sinks-also helps eliminate unwanted household guests.

Edited by Bob Sillery
Research by Reed Albergotti and Emily Bergeron

Source: http://www.popsci.com/scitech/article/2002-08/how-long-do-microbes-bacteria-and-viruses-live-surfaces-home-normal-room-tem

Wash your hands

Human skin — even in the most healthy of us — is teeming with bacteria. Most of those bacteria only cause disease under special circumstances. But everyone also carries potentially dangerous germs from time to time, such as staph, strep, and the intestinal bacteria that cause food poisoning and diarrhea. Sad to say, health care personnel — including your doctors and nurses — are particularly likely to carry the most troublesome bacteria, especially on their hands. And although viruses don't set up shop on the skin the way bacteria do, the viruses that cause diarrhea and respiratory infections — from the sniffles to the flu — can hang around on the hands long enough to spread from person to person.

If your skin is covered with so many bacteria, why don't they make you sick more often? Although the skin is a hospitable resting place for bacteria, it is also a tough barrier that prevents hostile bugs from reaching the body's vulnerable internal tissues. Ironically, perhaps, some of the traditional methods of removing bacteria from the skin can disrupt the skin's own defenses. Scrubbing can produce tiny abrasions that allow bacteria to sneak into your tissues. Detergents and even plain water can remove the skin's oils, which have important antibacterial properties.

Good handwashing, then, involves two potentially conflicting goals, removing microbes while still keeping your skin healthy.

Preached but not practiced

Handwashing is good advice — but do Americans follow it?

Often, we don't. When investigators surveyed public restrooms around the country, they found that only 83% of people washed up after using the toilet. Do posted reminders to "Please Wash Your Hands" help? When researchers tested this simple strategy, they found that handwashing improved in women but not in men.

The gender gap applies to hospitals, too. In one study, female physicians washed their hands after 88% of patient contacts, but male doctors washed after just 54%.

Does it work?

Yes. Just 30 seconds of simple handwashing with soap and water reduces the bacterial count on health care workers' hands by 58%. And there is an even better way: Alcohol-based handrubs reduce counts by 83%.

What's best?

Soap and water is the time-honored technique, and it does work. In fact, it's still the best way to remove visible soilage and particulate material. But as the public has become concerned about the risk of infection, soaps with antibacterial additives have gradually taken over 45% of the market. It's understandable, but it's not helpful; antibacterial soap is no better than ordinary soap, and the additives actually increase the risk of allergic reactions and other side effects.

Plain soap will do the job — and so will plain water. Tap water is excellent, and cool or lukewarm temperatures serve as well as hot water. If soap and water are not available, antibacterial wipes can help. Although they are not as effective, they will reduce bacterial counts. Washing with soap and water is the best way to remove dirt, but waterless, alcohol-based handrubs are even better at killing germs. Handrubbing is faster and more convenient than handwashing, and it's also easier on the skin. Hospitals are switching to handrubs because they kill more bacteria and viruses and they are used more regularly.

When and how

How should you wash? Wet your hands with water, then apply the soap to your palms. Rub your hands together briskly for at least 15 seconds before rinsing.

Wash your hands before each trip to the dining room and after each trip to the bathroom. Wash after handling diapers and animals. Wash before and after you handle food. Wash after you take out the trash, work in the yard, clean the house, repair the car, or do other messy chores. Wash before and after sex. Wash after you come in contact with anyone who is sick. If you follow reasonable guidelines you'll be washing often, but you won't become obsessive or compulsive. Be careful, not fearful.

August 2006 Update

Source: http://www.health.harvard.edu/fhg/updates/update0806d.shtml

Inquiry Questions

Individual

- Locate your inquiry notetaker
- Add today's date and article titles to the date and source column.
- Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions. Also add any new ideas that you have about the concepts:
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- In the evidence column note the evidence from the texts that support the new ideas or spark the questions.

Pair Discussion

- Take one minute each to share your new ideas, questions and evidence about
    - the three inquiry questions
    - Infect / infection
    - antibiotic resistant / antibiotic resistance
    - evolve/evolution
- Discuss commonalities and differences
- Add great ideas from your partner to your own inquiry notebook

Whole Class Discussion

- Share a new idea or a new question and evidence about the inquiry questions
- Add great ideas from your peers to your own inquiry notebook

Lesson 15 – Warm Up

Individual

Over the last couple weeks we studied about MRSA and made sense of the science. Now it is time to determine a course of action to limit the impact of MRSA. Brainstorm response for each of the following:

- What course of action could limit the progress of MRSA and the progress of antibiotic resistance in MRSA?
- Who would have to act to make a difference?
- Who in your community needs to act?
- What is likely to happen if people do not act?

Pairs

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.

Whole class

- Share your response or your partner's response.
- Add peers' ideas onto your own response.

MRSA Recommendations

Overview

Identify a **problem** in your community related to the MRSA epidemic.

For example

- Washing hands is a proven way to reduce the spread of MRSA because …
- But washing hands before lunch at school is impossible because….
- The consequences of limited hand washing are …
- This is important to students, staff and faculty because ….

Process guidelines

- Work in small teams
- Brainstorm possible problems
- Review the warm-up, science models for MRSA, inquiry notes, and texts to spark ideas
- Size up the problem
- Select a problem that is both worthy of action and likely to be actionable
- Prepare a description of the problem

Determine a **course of action** for your community that addressed the problem your team identified.

For example

- One course of action that might help with the hand washing problem is … because …

Next steps

- Continue with same team
- Brainstorm for a possible course of action
- Review the warm-up, science models for MRSA, inquiry notes, and texts to spark ideas
- Select a course of action that will work – enact it mentally drawing on your MRSA models – to predict how it may work

Make a compelling scientific **recommendation** for the course of action your team determined.

For example

- We recommend that …
- If the recommendation is enacted then …
- If the recommendation is not enacted then …
- The course of action is effective because …
- It is important to understand that …
- You may think … but in fact …. Therefore …

Next steps

- Continue with same team
- Decide who the audience is for the recommendation
- Prepare a description of the course of action
- Prepare of explanation of how and why the course of action will be effective
- Include information the audience needs to know to understand the recommendation
- Address misconceptions that might interfere with the audiences understanding

Make a **poster** presenting the recommendation your team created for the science seminar.

Include

- The problem in your community related to the MRSA epidemic
- The course of action
- The compelling scientific recommendation for the recommendation
- The audience for the recommendations

Next Steps

- Continue with same team
- Refine your recommendation
- Use visuals and words

MRSA Recommendation Science Seminar

Small groups

Travel from poster to poster with your group. At each poster, read and discuss the model. Make notes for each poster about:

- What is clear or unclear?
- What is unclear or misrepresented?
- What is missing?
- What is does not belong?
- What commonalities and differences do you notice?

Whole Class Discussion

Return to your tables.
Volunteers share an observation, connection, thought, question or insight about posters they read.

Small groups (optional)

Refine you recommendation and commutate them to the target audience.

MRSA Inquiry Reflection

Individual

Respond to each of the following prompts.

- What have you learned that you may find useful in the future?

- What do you want to learn more about?

MRSA Transmission and Infection

Lesson 1

Materials: MRSA interactive notebook, poster paper & markers for: SOLAR listening poster (Square, Open, Leaning-in, Affirming, Reflecting), MRSA brainstorm poster, Connie's story poster
Grouping: individual, pairs, whole class
Lesson Steps

1) Goals
   a) Build student engagement for inquiry into MRSA
   b) Introduce 4 core routines of the module
      i) Think-Pair-Share
      ii) Warm-ups and Gateway activities
      iii) SOLAR listening
      iv) Writing response to inquiry questions in inquiry notebooks
2) Set up
   a) Prepare posters for SOLAR listening, MRSA brainstorm, and Connie's story
   b) Prepare to play and project Connie's story from ARHQ website
   c) Pass out MRSA materials to each student

3) WARM-UP – activate students' schema about MRSA bacteria [13 min.]
   a) PREVIEW
      i) Ask students to read the introduction and clarify it with a partner. Elicit questions. Respond or clarify as needed.
      ii) Locate MRSA interactive notebook and inquiry notetaker
      iii) Invite students to preview the materials for a minute.
      iv) Invite students questions about the materials … respond or redirect to class as needed.
      v) Preview the agenda for the day (MRSA brainstorm warm-up, Video, MRSA Inquiry Questions, Inquiry Notetakers)
   b) MRSA brainstorm using the Think-Pair-Share protocol [10 min.]
      i) Locate and project: MRSA brainstorm in the MRSA interactive notebook p ____.
         (1) "*What do you know, think, possibly remember or wonder about <u>bacteria</u>, <u>infection</u>, <u>antibiotics</u> and/or <u>MRSA</u>?"*
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed. E.*g. "What is something you and your partner figured out or are still wrestling with?" "Tell me what you understand about what you are going to do?"*
      iii) Ask students to respond to the brainstorm prompt.
      iv) Individual thinking and writing
      v) Locate SOLAR poster and introduce SOLAR listening practices for pair talk.
      vi) Form pairs and ask pairs to take turns sharing their ideas for one minute each.
      vii) Ask students to share one idea of their own or of their partner.
      viii) Chart students' ideas onto MRSA Brainstorm poster

4) GATEWAY ACTIVITY – View and discuss *Connie's Story* video and discuss [25min]
   a) Locate and project: Connie's Story video inquiry prompts in the MRSA interactive notebook p ____. http://webmm.ahrq.gov/perspective.aspx?perspectiveID=58
      i) As you view the video, make notes about interesting ideas from the video. Also, write the questions and connections that you form.

   b) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   c) Explain: We will watch a video interview of a nurse - Constance Lehfeldt. She'll talk about her experience having a MRSA infection. We'll play the video for 3 minutes and then pause for a minute for them to add to our notes.
   d) Play the video pausing twice at about 3 and 6 minutes for one minute each. Prompt students to add to their notes during these pauses and for one minute after the video is done.
   e) Form pairs and ask pairs to take turns sharing their ideas for one minute each.
   f) Ask students to share one idea of their own or of their partner.
   g) Chart students' ideas onto a Connie's Story Poster. Probe especially for questions relating to relevance, causation, and risk control, so that if possible the students generate the inquiry questions for the investigation. See below.

5) INQUIRY QUESTIONS – introduce MRSA module inquiry questions [6min]
   a) Teacher Introduction/transition (brief)
      i) We've just created many great questions about MRSA based on Connie's story. Our goal for the MRSA investigation is to pose questions about MRSA and develop answers for our questions.
   b) Invite students to identify the themes in their questions
      i) I'm noticing some really important science investigation theme in your question one of them is relevance. Here is one question that is about relevance … Who can identify another question from our list about relevance … (respond and repeat)
      ii) Repeat for causation and then for risk control
   c) Locate Inquiry questions poster (blank).
   d) Chart an inquiry question for each theme to the blank inquiry questions poster using as much student generated language as possible
      i) RELVANCE Question: What is the relevance of Methycillan-Resistant Staphylococcus Aureus? OR, Why should I or others care about MRSA?
      ii) CAUSATION question: What causes Methycillan-Resistant Staphylococcus Aureus to emerge and increase? OR, Where did MRSA come from? How do you get MRSA?)
      iii) RISK-CONTROL Question: What can limit the risk of Methycillan-Resistant Staphylococcus Aureus? Or, How do we prevent MRSA?
   e) Explain: Whenever we read, write, talk, and listen we'll will keep the inquiry questions right out in front. We'll refer to this poster to remind us.

6) MRSA INQUIRY NOTEBOOK – introduce materials and protocol for consolidating knowledge [8min]
   a) Teacher Introduction/transition (brief)
      i) Explain: Whenever we have accomplished significant interactions about MRSA (such as reading and discussing a few different sources), we will take time to write individually to consolidate our thinking about MRSA. Over time our ideas about MRSA will change because read more, thought more and talked more.
      ii) Locate: the MRSA inquiry notetaker.
      iii) Ask students to preview the notetaker and to clarify the headings with a partner.
         (1) Ask student what they noticed and wondered? Probe for clarifying questions. Respond to student questions or redirect the questions to peers who may have a response.
      iv) It is the first day of the investigation and already we've brainstormed about MRSA, we watched a video about a MRSA survivor and developed great inquiry questions about MRSA. So, we have had a significant interaction around MRSA and it is a good time to write.
   b) Locate the Inquiry Questions prompts in the interactive notebook p____ .
      i) Individual
         (1) Locate your inquiry notetaker
         (2) Add today's date and article titles to the date and source column.
         (3) Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions. Also add any new ideas that you have about the concepts:
            (a) Infect / infection
            (b) antibiotic resistant / antibiotic resistance
            (c) evolve/evolution
         (4) In the evidence column note the evidence from the texts that support the new ideas or spark the questions.
   c) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
      i) Model noting the date and source (class brainstorm & Connie's Story) in the left-hand Date & Source' column and ask students to do likewise.
      ii) Model writing a few thoughts into the *evidence* and *interpretation* columns.
         (1) Write out a few sentence starters.
            (a) For evidence: "I noticed in the video …' 'Connie said that …'
            (b) "So I think that MRSA …", "Now, one question I have is …"
   d) Ask students to write 2-3 thoughts they now have about MRSA relevance, causation and/or risk-control in the *evidence* and *interpretation* columns.

7) CLOSURE [2 min]
   a) Summary of day: Today, we started our inquiry into MRSA. We brainstormed ideas we already had. We watched a video about a nurse who had a MRSA infection. We started gathering our ideas into three inquiry notetakers. We took time to consolidate some of our ideas. These are just a few of the kinds of interactions in the unit.
   b) Preview of next day: Tomorrow we'll continue our inquiry into MRSA when we meet by considering the cases other people who had a MRSA infection.
   c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

MRSA Transmission and Infection

Lesson 2

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters (one each) for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall

Grouping: individual, pairs, whole class

Lesson Steps

1) Goals
   a) Elicit prior knowledge about 3 key concepts, infection, evolution and antibiotic resistance, as a foundation for supporting conceptual change
   b) Deepen student engagement for inquiry into MRSA
   c) Begin student's Inquiry into their own reading process
   d) Gather more evidences & interpretations about MRSA inquiry questions from news articles
   e) Introduce 7 more routines of the module
      i) Reading previews
      ii) Strategic Teacher Think Aloud Model
      iii) Paired Think Aloud with Annotation
      iv) Metacognitive Conversation about reading process
      v) Reading Strategy List
      vi) Concept Building posters
      vii) MRSA word wall

2) Set up
   a) Create Concept building posters for each word family: infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance; create a reading strategies list poster, MRSA word wall (poster)
   b) Pass out MRSA materials to each student

3) WARM-UP – activate schema about three key science concepts [8min]
   a) Review previous day: Yesterday, we shared our ideas and questions about MRSA and watched a video about a Nurse who had MRSA. We identified inquiry questions to pursue throughout the unit.
   b) Preview agenda: *Today we will read a news articles about people who suffered a MRSA infection. We engage in inquiry about how we read science texts, building knowledge about science concepts and we'll also think about our inquiry questions. We'll begin by accessing our prior knowledge of three key science concepts that we'll about throughout the MRSA investigation.*
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) *What do you know or think about the terms (pick any two word families) infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance?*
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   e) Ask students to respond to the prompt,
   f) Individual thinking and writing
   g) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
   h) Form pairs and ask pairs to take turns sharing their ideas for 60 seconds each.
   i) Whole class discussion
      i) Locate concept building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance.
      ii) Explain that as we read and talks we add to and refine our ideas about science concepts. We'll use concept building posters to share our developing ideas. Later we'll use the inquiry notebooks to consolidate our ideas about these terms.
      iii) Ask students to share ideas about each term that (use an equitable sharing protocol)
      iv) Chart students' ideas about: *infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance* onto the concept building poster. Probe for range of ideas about each, do not comment on students ideas.
      v) Explain that we'll revisit these words to see if we have any new or different ideas to add to the poster.

4) CLOSE READING – support students' inquiry into their own reading processes
   a) READING PREVIEW – identify possible challenges and cultivate motivations [5 min]
      i) Locate and project: MRSA Reading Preview in the MRSA interactive notebook p ____.
         (1) Take two minutes to look over the articles ''Superbug MRSA Worries Doctors, Athletes" and "Kansas City Teen Gets MRSA from Attempted Lip Piercing, Almost Dies."
            (a) What might be challenging about reading these two articles?
            (b) What might be interesting about reading these two articles?
      ii) Ask students to read and clarify 'individual' prompt with partner. Check for understanding. Clarify as needed.
      iii) Locate: *'Superbug' MRSA Worries Doctors, Athletes' &' Kansas City Teen Gets MRSA From Attempted Lip Piercing, Almost Dies'*
      iv) Individual thinking and writing. Monitor and support students.
      v) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
      vi) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for one minute each.
      vii) Whole class discussion
         (1) Ask students to share challenges and interests? Probe for commonalities and differences. (Use an equitable sharing protocol)
   b) Model Contextual Redefinition – Teacher models reading process and students reflect on own reading processes [4 min]
      i) Locate and Project: Reading Inquiry in the MRSA interactive notebook. 'Teacher Model and Think aloud talk stems'
      ii) Ask students to read and clarify the prompt and Think Aloud Talk stems with partner. Check for understanding. Clarify as needed.
      i) Locate and Project: *'Superbug' MRSA Worries Doctors, Athletes'* article
      ii) Model with Think Aloud -- noting new words/words use in new ways and clarifying words using text clues (word level and context level) and schema (world/personal, text/genre, discipline and language). Some possible terms from the 'Superbug' MRSA article are denizen, communal, antibiotic, resistant.
      iii) Ask student what they noticed you do? Probe for multiple voices and perspectives. (use an equitable sharing protocol)
      iv) Locate the reading strategies list poster (blank unless you have one already in use in your classroom)
      v) add one strategy that students noticed you using to the reading strategies list poster.

c) Students read and Think Aloud – support close reading [?? min]
   vi) Locate and project: Locate and project: MRSA Think Aloud in the MRSA interactive notebook p ____.
   vii) Form Pairs
   viii) Ask students to read the protocol and clarify it with their partner.
      (1) Take turns thinking aloud by paragraph for the first section.
         (a) One partner thinks aloud. The Think Aloud Talk Stems for examples of ways to talk about your reading process.
         (b) The other partner makes notes in the margin of the text about their partner's thoughts.
      (2) After reading discus and respond to the prompt:
         (a) "What new words or word-uses did you encounter? How did you make sense of their meaning? Which do you have questions or uncertainty about?"
   ix) Check for understanding. Respond to questions or redirect questions to students to resolve.
   x) Pairs reading and talking – monitor, support pairs, note words students are grappling with as possible discussion starters for the subsequent whole group discussion.

*The chunking of the process and text here should be tuned to balance student stamina for reading and metacognition.

d) Whole class discussion
   (1) Ask students to share words grappled with or new words/usages they noticed and how they made sense of them. Probe for text evidence, schema, multiple voices and multiple perspectives.*
   (2) Add to reading strategies to the reading strategy list.
   (3) Locate MRSA word wall.
   (4) Invite students to add words (that have been discussed or words that are otherwise interesting) to the MRSA word wall.
   (5) Repeat pairs Think Aloud and whole class discussion for the remaining sections and second article.

*If students propose a prediction for a word's meaning inconsistent with the meaning in the text AND the text affords context supporting meaning such as additional uses of the word, context clues about the gist of the word or hidden definition, then use the word for a focused language learning lesson. Depending on your assessment of the student's use the occasion to strategically model your own processes for making sense of the words or redirect students to further grappling with the word's meaning by directing pairs to re-read an excerpt by which they have high probability to clarify the word at least in part and they sharing what clues they've found and discoveries they've made.

5) CONCEPTUAL CHANGE - update concept building posters with new ideas about key concepts
   a) Locate concept building poster fo*r infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance*
   b) Ask pairs to locate instance in the articles where they encountered the key science concepts (*infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance)* and discuss any new or revised ideas they have about these concepts.
   c) Pairs talk. Monitor and support.
   d) Whole group discussion
      i) Ask students to share their ideas about the key science concepts. Probe for even slightly revised or expanded understandings of these concepts. Probe for text evidences for these.
      ii) Chart students' ideas and evidences onto the concept building posters.

6) INQUIRY QUESTIONS – update notebook with new thoughts about MRSA
   a) Locate the Inquiry Questions prompts in the interactive notebook p____ .
      i) Individual
         (1) Locate your inquiry notetaker
         (2) Add today's date and article titles to the date and source column.
         (3) Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions.
         (4) In the evidence column note the evidence from the texts that support the new ideas or spark the questions.
   b) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
   c) Locate inquiry notetaker.
   d) Model drawing line below preceding entry and adding today's date and article titles to left hand (date & source) column.
   e) Ask students to do likewise.
   f) Individual writing. Monitor and support
   g) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
   h) Pairs discussion
   i) Whole class discussion.
      i) Ask students/pairs to share one best new idea about the inquiry questions.
      ii) Invite student to add good ideas from their peers into their own notebook.
      iii) Probe for multiple voices, multiple perspectives and text evidence.

7) CLOSURE
   j) Summary of day: Today, we read two articles about MRSA. We thought about how we make sense of words we encounter while we read. We started concept building posters for three key science concepts and added to them.
   k) Preview of next day: Tomorrow, we'll continue our inquiry into MRSA by constructing a model of how MRSA infection occurs.
   l) Collect materials
      i) The MRSA interactive notebooks and MRSA Inquiry notebooks.

MRSA Transmission and Infection

Lesson 3

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall

Grouping: individual, pairs, whole class

Lesson Steps

1) Goals
   a) Elicit students schema about evidence and model (science model) and help them to collaboratively bootstrap toward a more resolved understanding. All this to provide equity for students with difference familiarity with these concepts and build science language knowledge that of words have multiple meanings and specific meanings in science.
   b) To build knowledge about MRSA transmission and infection and build fluency with MRSA related science language
   c) To build student knowledge for forming scientific models and build fluency with science discourse
   d) Students develop knowledge of cross text integration and synthesis
   e) I Introduce 4 more routines of the module
      i) Protocol for identifying evidence
      ii) Creating visual models
      iii) Creating written models and arguments
      iv) Peer Review

2) Set up
   a) Pass out MRSA materials to each student
   b) Re-display posters: inquiry, concept building posters, MRSA word wall

3) WARM-UP
   a) Review work to date: We've read about a few people who had MRSA infections. We've created inquiry questions and began collecting evidence and ideas to respond to the inquiry questions. We've also thought about how we read and how we build concepts as we encounter them.
   b) Preview Agenda: Today we are going to focus on one inquiry question in particular – [read aloud the causation question]. We will create models for how MRSA infections occur.
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      (1) Respond to one of the following prompts.
      (2) Describe a real life experience when you had a lot of information but only some of it was evidence? What is the difference between information and evidence?
      (3) What are different meanings for the word 'model?' What might the word model mean in science? What are examples of science models you have encountered?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.

e) Ask students to respond to the prompt,
f) Individual thinking and writing. Monitor and support students. Invite students to use books or resources to find examples of science models.
g) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for 60 seconds each.
h) Whole class discussion
   i) Ask student to share response about information vs. evidence. Probe for the distinction and how they could tell which information was evidence.
   ii) Ask students about the meanings of the word model. Especially, draw out examples and characteristics of science model such as based on evidence, logically cohesive, makes few assumptions, is simple/elegant. May need to briefly share own examples, illustrations.
i) Transition: We just discussed the difference between information and evidence. The two articles we read yesterday have a lot of information in them. Only some of that information is evidence about how MRSA infection occurs. We need to find that evidence because it is the basis from which we'll build our models of how MRSA infection occurs. We also discussed scientific models compared to other kinds of models because forming scientific models and explanation is a lot of what science is for.

4) FINDING EVIDENCE for MRSA Transmission and Infection process
   a) Locate and project: 'Finding Evidence for the MRSA Infection process' in the MRSA interactive notebook.
      i) Re-read the two articles with a partner to find evidence for how MRSA is transmitted and how MRSA infections occur. Underline or highlight the evidences you find. Discuss how you know what counts as evidence.
   b) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   c) Locate and project: *'Superbug' MRSA Worries Doctors, Athletes'*
   d) Explain that you will model with Think Aloud finding evidence and that the whole class gets to be your 'partner'
   e) Model finding and highlighting evidence MRSA Infection process with Think Aloud – express not only the evidence you find but also how you decided that it is evidence.
   f) Ask students to respond to your thoughts and to locate another piece of evidence t which you respond. Focus talk on how you and the student know what counts as evidence.
   g) Form pairs
   h) Invite pairs to find evidences.
   i) Pairs reading and talking. Monitor and support. Listen to find interesting examples of pairs identifying evidences and how they knew it counted as evidence.
   j) Whole group discussion
      i) Ask students to volunteer evidences they found and how they knew it counted as evidence. Probe for multiple voices and multiple perspectives about the evidences. Also probe for agreements and disagreements, instance of students changing their mind about what counts as evidence.

ii) Invite student to mark on their own articles evidences their peers uncover and to change their minds about excerpts they no longer think are evidences if they change their mind.

5) FORMING VISUAL REPRESENTATIONS for MODELS of MRSA transmission and infection
   a) Transition: "We identified a lot of information from the two articles about how MRSA infection occurs. Now we'll want to organize that information into a model that explains how MRSA infection occurs. We'll start by creating visual representations of a model of how MRSA infection occurs. Then we'll compose written representations for our models. We'll take time to consider each others' models and find exemplars to uncover what makes a science model good.
   b) Brainstorm possible visual representations for MRSA model.
      i) Locate and project: Visual Representations for MRSA Infection Model individual prompt
         (1) What kinds of visual representation might help organize the into a model about how MRSA transmission and infection occurs?
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
      iii) Individual work time – monitor and support
      iv) Form pairs
      v) Ask pairs to take turns sharing ideas and adding peers good ideas to their own responses
      vi) Whole class discussion
      vii) Ask students to share ideas about visual representations for MRSA infection model.
   c) Draft Visual Model Creation
      i) Locate and project: Visual Representations for MRSA Infection Model small group prompt
         (1) Create a visual representation of a model for depicting how MRSA infection occurs
      ii) Ask students to read and clarify the prompts with partner. Check for understanding. Clarify as needed.
      iii) Form small groups
      iv) Small group work – monitor and support small groups – note interesting challenges, responses, and emerging exemplars.
   d) Peer Review
      i) Locate and project: Visual Representations of the model for how MRSA transmission and Infection occurs -- Peer review prompts
         (1) This is your opportunity to get and give feedback to peers and help each other improve your visual models.
            (a) Each group takes a few minutes to show and explain their visual representation.
            (b) Listeners take a turn to share:
               (i) What is clear in the visual model?
               (ii) What is unclear or misrepresented in the visual model?
               (iii) What is missing from the visual model?
               (iv) What does not belong in the visual model?

ii) Ask students to read and clarify the prompts with partner. Check for understanding. Clarify as needed.

iii) Form pairs of small groups for cross group discussion.

iv) Cross group talking – monitor and support small groups – note interesting challenges, responses, and emerging exemplars.

6) COMPOSING WRITTEN REPRESENTATIONS for MODELS of MRSA transmission and infection

a) Transition: "Visual representations such as charts, graphs, diagrams, equations and tables are huge in science. Visuals communicate ideas more effectively than words alone. But visuals alone can be puzzling. So, visuals are generally paired with words --- word incorporated into the visual (as in many of our MRSA infection models), Titles and captions above and below the visual and exposition nearby the visual (as in our textbooks). We are going to focus next on composing words to work with our visuals in representing a model of how MRSA infection occurs."

b) Locate and project: Written Representations for MRSA Infection Model small group prompts

i) Compose a written representation of your model explaining how MRSA transmission and infection occurs

c) Ask students to read and clarify the prompts with partner. Check for understanding. Clarify as needed.

d) Small group work

7) CLOSURE

a) Summary of day: Today we created visual and written representations of a model for MRSA transmission and infection.

b) Preview of next day: Tomorrow, we will 'publish' our work on posters and learn together more about MRSA and more about forming own our models of science processes.

c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

MRSA Transmission and Infection

Lesson 4

Materials: MRSA interactive notebook and inquiry notebook, Poster paper for MRSA infection models poster, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall

Grouping: individual, pairs, groups of 4 (and as needed groups of 3), whole class

Lesson Steps

1) Goals
   a) To build knowledge about MRSA transmission and infection and build fluency with MRSA related science language
   b) To build student knowledge for forming scientific models and build fluency with science discourse
   c) Students develop knowledge of cross text integration and synthesis
   d) I Introduce 1final routines of the module
      i) Science Seminar

2) Set up
   a) Pass out MRSA materials to each student
   b) Re-display posters: inquiry, concept building posters, MRSA word wall

3) WARM-UP
   a) Review previous work: Yesterday we developed visual and written models for MRSA transition and infection.
   b) Preview agenda: Today we will 'publish' our work on posters and learn together more about MRSA and more about forming own our models of science processes.
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) Respond to any two of the following prompts.
         (1) What is one part of your MRSA transmission and infection model that you are proud of? Why?
         (2) What was challenging about creating your model? How did you resolve the challenge?
         (3) What is one part of your model in which you had to make a guess, assumption of inference? What was your reasoning or rationale for making it?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   e) Ask students to respond to the prompt,
   f) Individual thinking and writing. Monitor and support students.
   g) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for 60 seconds each.
   h) Whole class discussion
      i) Ask students for their ideas. Probe for metacognition and elements of reasoning & argumentation

i) Transition: Thinking about our own work is one way to learn. Reading and thinking about others work is another. The gallery walk will help us do that.

4) IDENTIFYING EXEMPLARS AND ARGUMENTS with a science Seminar
   a) Small group work making poster
      i) Locate, project prompts in the MRSA interactive notebook p ____.
      ii) Make a poster that displays both the visual and written representations of your group's model for MRSA transmission and infection
      iii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
      iv) Group Work - Monitor and support – note exemplars in preparation of whole class discussion, facilitating posting the posters
   b) Science Seminar (like a gallery walk)
      i) Travel from poster to poster with your group. At each poster, read and discuss the model.
         (1) Make notes for each poster about:
         (2) What is clear about the model?
         (3) What is unclear or misrepresented in the model?
         (4) What is missing from the model?
         (5) *What does not belong in the model?*
         (6) What *commonalities* and differences do you notice?
   c) Discussion exemplars and why they are good. Probe for concrete examples of underlying principles for science models as well as elements of reasoning & argumentation used to advance models as exemplars.

5) INQUIRY QUESTIONS – update notebook with new thoughts about MRSA
   a) Locate the Inquiry Questions prompts in the interactive notebook p____ .
      i) Individual
         (1) Locate your inquiry notetaker
         (2) Add today's date and activity to the date and source column.
         (3) Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions. Also write any new ideas you have about the concepts:
            - *Infect / infection*
            - *antibiotic resistant / antibiotic resistance*
            - *evolve/evolution*
         (4) In the evidence column note the evidence from the texts that support the new ideas or spark the questions.
   b) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
   c) Locate inquiry notetaker.
   d) Model drawing line below preceding entry and adding today's date and article titles to left hand (date & source) column.
   e) Ask students to do likewise.
   f) Individual writing. Monitor and support
   g) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
   h) Pairs discussion
   i) Whole class discussion.
      i) Ask students/pairs to share one best new idea about the inquiry questions.
      ii) Invite student to add good ideas from their peers into their own notebook.
      iii) Probe for multiple voices, multiple perspectives and text evidence.
      iv) Add new ideas about key concepts to concept building posters.

6) Closure
   a) Summary of the day: Today we gave and got feedback about our Models of MRSA transmission and infection. We identified exemplars and reflected on our own learning.
   b) Preview of next day: Tomorrow we'll read a couple new texts about MRSA. Our inquiry focus will shift from the causation question toward relevance question.
   c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

Sizing-up MRSA

Lesson 5

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall

Grouping: individual, pairs, groups of 4 (and as needed groups of 3), whole class

Lesson Steps

1) GOALS
   a) Build student curiosity , engagement and agency for word learning while reading
      i) Noticing new words, assessing relative importance of clarify words (when to and how much to), mustering multiple schema (world, text, language, discipline) to clarify words in context
   b) Build students knowledge about development of SA to MRSA and antibiotic resistance

2) Set up
   a) Pass out MRSA materials to each student
   b) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list

3) WARM-UP
   a) Review previous work: Yesterday we finished making models for MRSA infection and transmission to begin to answer our inquiry questions about the cause of MRSA.
   b) Preview agenda: Today we will we will read two more texts about MRSA. Our next learning goal is to respond to the questions about the relevance of MRSA – who should care about MRSA and how much? *(use the student generated questions as much as possible)*
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) What is a word that for you the meaning has changed over time? How did it change and why? (I used to think that ____ meant but now I know that it means ____ because ___ .)
      ii) Have you learned a new word and then began noticing that word frequently? What was the word? When did you learn it? Where do you then recall noticing it? Do you think that you actually had never seen the word before?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed. Teacher could share one example …in 60 seconds ….
      i) I used to think that ____ meant but now I know that it means ____ because ___ .
      ii) I learned ____. Then I saw it ____. I think this is because …
   e) Pair discussion - monitor and support. Also, not interesting responses for whole class discussion.
   f) Whole Class discussion– Probe for interesting word learning experiences. Goal is to cultivate greater disposition for language learning.

4) CLOSE READING
   a) Transition: When we read we think about how and why read as well as what we reading. Today we'll continue our focus about learning words while reading. This is about noticing new words and familiar words used in different ways. It is about figuring out which new words/usages are most important to clarify now to get the gist of text, which new words/usages I may need to know later but not now, which new words/usages that I'm just curious about, and which new words/usages I can probably ignore for the time being. It about pulling together clues from the words, clues from the context and our own knowledge to makes sense of the word, as much as possible. It's about taking control of our own reading and learning.
   b) SURVICAL WORDS Reading Inquiry with THINK ALOUD
      i) Locate and project: Survival Words prompts in the MRSA interactive notebook p ____.
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed. Model with Think Aloud, if clarification need is acute.
      iii) Locate *Superbug, super-fast evolution* text in the MRSA interactive notebook p ___.
      iv) Individual preview. Monitor and support.
      v) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
      vi) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for one minute each.
      vii) Whole group discussion of survival words selection
         (1) Invite students to share survival words and reasons for picking them. Probe for strategies for deciding which words are worth understanding.
         (2) Add to reading strategy list.
      viii) Ask students to read and clarify 'pairs Think Aloud' prompt with partner. Check for understanding. Clarify as needed.
      ix) Pairs Think Aloud
      x) Whole class discussion of clarification of survival words.
         (1) Invite students to share how they clarified survival words and what they mean in this text.
         (2) Probe for reading strategies. Add to reading strategies list.
         (3) Also invite students to share other reading challenges, questions, connections, ah-ha's.
         (4) Invite students to add to MRSA word wall
      xi) Repeat Survival words inquiry (steps i through x) with the next text, *Antibiotic resistance*

5) CONCEPTUAL CHANGE and INQUIRY QUESTIONS – update notebook with new thoughts about MRSA
   m) Locate the Inquiry Questions prompts in the interactive notebook p____ .
      i) Individual
         (1) Locate your inquiry notetaker
         (2) Add today's date and article titles to the date and source column.
         (3) Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions.
         (4) In the evidence column note the evidence from the texts that support the new ideas or spark the questions.
   n) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
   o) Locate inquiry notetaker.
   p) Model drawing line below preceding entry and adding today's date and article titles to left hand (date & source) column.
   q) Ask students to do likewise.
   r) Individual writing. Monitor and support
   s) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
   t) Pairs discussion
   u) Whole class discussion.
      i) Ask students/pairs to share one best new idea about the inquiry questions.
      ii) Invite student to add good ideas from their peers into their own notebook.
      iii) Probe for multiple voices, multiple perspectives and text evidence.

6) CLOSURE
   a) Summary of day: Today we read and discussed two texts about MRSA. We also discussed how we decide which unfamiliar words & word usages to clarify right away.
   b) Preview of next day: Tomorrow, we will read three more texts about MRSA keeping with our the questions about the relevance of MRSA – who should care about MRSA and how much?
   c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

Sizing-up MRSA

Lesson 6

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall

Grouping: individual, pairs, whole class

Lesson Steps

1) GOALS
   a) Build students knowledge for reading three genres of science texts: two kinds of graphs and a chronology.
   b) Build student knowledge of the development of the MRSA epidemic

2) Set up
   a) Pass out MRSA materials to each student
   b) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list

3) WARM-UP
   a) Review previous work: Yesterday we read and discussed two texts about MRSA. We also discussed how we decide which unfamiliar words & word usages to clarify right away.
   b) Preview agenda: Today we will read three more texts about MRSA keeping with our the questions about the relevance of MRSA – who should care about MRSA and how much?
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) Briefly look at the next tree texts: Comparison of Estimated Death in U.S. in 2005, MRSA History: The First Half-Century, 1959–2009, Resistance to the antibiotic Vancomycin
      ii) What might be challenging about reading these three texts?
      iii) What might be interesting about reading these three texts?
   d) Locate *Comparison of Estimated Death in U.S. in 2005, MRSA History: The First Half-Century, 1959–2009, Resistance to the antibiotic Vancomycin*
   e) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   f) Individual work
   g) Pair discussion - monitor and support. Also, not interesting responses for whole class discussion.
   h) Whole Class discussion
      i) Invite students to share responses. Probe for interests and potential challenges. This discussion may touch on a range of issues – confidence, anxiety, interest, disinterest, social aspect of reading, reading processes, -- connected to the text types and/or content – any of which is has value to be shared.

4) CLOSE READING
   a) Transition: When we read we think about how and why read as well as what we reading. Today we'll shift our focus from handling new words to reading visual texts.
   b) Locate and project: Visual Texts Reading Inquiry prompts in the MRSA interactive notebook p ____. Also locate *Comparison of Estimated Death in U.S. in 2005, MRSA History: The First Half-Century, 1959–2009, Resistance to the antibiotic Vancomycin*
   c) Teacher Model making thinking visible with Think Aloud with *Comparison of Estimated Death in U.S. in 2005*
   d) Ask students what they noticed in the teacher Think Aloud model
   e) Ask students to read and clarify the pairs prompt with partner. Check for understanding. Clarify as needed. Model with Think Aloud, if clarification need is acute.
   f) Pairs Think aloud. Monitor and support.
   g) Whole group discussion of reading process for reading bar graph.
      i) Invite students to share reading processes that helped a lot reading this graph.
      ii) Add to reading strategy list.
   h) Repeat Visual Texts Reading Inquiry with *History: The First Half-Century, 1959–2009,* and then *Resistance to the antibiotic Vancomycin.* In the whole class discussions probe for how and why they read each kind of texts differently. Also, invite students to compare the reading strategies they used for each visual text.

5) CONCEPTUAL CHANGE and INQUIRY QUESTIONS – update notebook with new thoughts about MRSA
   v) Locate the Inquiry Questions prompts in the interactive notebook p____ .
      i) Individual
         (1) Locate your inquiry notetaker
         (2) Add today's date and article titles to the date and source column.
         (3) Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions.
         (4) In the evidence column note the evidence from the texts that support the new ideas or spark the questions.
   w) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
   x) Locate inquiry notetaker.
   y) Model drawing line below preceding entry and adding today's date and article titles to left hand (date & source) column.
   z) Ask students to do likewise.
   aa) Individual writing. Monitor and support
   bb) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
   cc) Pairs discussion
   dd) Whole class discussion.
      i) Ask students/pairs to share one best new idea about the inquiry questions.
      ii) Invite student to add good ideas from their peers into their own notebook.
      iii) Probe for multiple voices, multiple perspectives and text evidence.

6) CLOSURE
   a) Summary of day: Today we read discussed tow texts about MRSA. We also discussed how we decide which unfamiliar words & word usages to clarify right away.
   b) Preview of next day: Tomorrow, we will read three more texts about MRSA keeping with our the questions about the relevance of MRSA – who should care about MRSA and how much?
   c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

Sizing-up MRSA

Lesson 7

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall, Evidence and Warrants posters (NEW), recommended – highlighters, sticky notes

Grouping: individual, pairs, whole class

Lesson Steps

1) GOALS
   a) Leverage personal schema for sizing up problems for sizing up MRSA
   b) Building knowledge of warranting evidence in science argumentation
   c) Build students knowledge of how to locate evidence among a wider body of information
   d) Build student knowledge of the development of the MRSA epidemic

2) Set up
   a) Create Evidence and Warrants posters (used for about 3 days now and needed again at end of unit) – the format is a T chart.
   b) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list
   c) Plan how to form small groups of 4 and as needed a group of 3.
   d) Pass out MRSA materials to each student

3) WARM-UP – purpose: eliciting a schema for disciplinary argumentation around problem assessment
   a) Review previous work: Yesterday we finished read three visual texts about MRSA.
   b) Preview agenda: Our current learning goal is to respond to the questions about the relevance of MRSA – who should care about MRSA and how much? *(use the student generated questions as much as possible) So, today we will think about how to size up MRSA. What counts as evidence and why?*
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) Describe a problem which you have encountered, for example when you had a huge amount of homework due on the same day. How did you size-up the problem and decide whether to ignore it, worry about it, take action for it, or make addressing it a high priority. What kinds of information did you use? Why?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed. Specifically check 'sizing-up' for students.
   e) Individual work
   f) Pair discussion - monitor and support. Also, not interesting responses for whole class discussion.
   g) Whole Class discussion–
      i) Invite student to share responses to the warm-up
      ii) Chart on an evidence and warrant poster (this poster is only needed for a few minutes)

iii) Probe for both kinds of information (evidence) and for why the information is relevant (warrants) –T*he 'why' may take more supportive probing to elicit due to many factors including deep cultural norms limiting expression of warrants.*
iv) Use one or two examples from students to highlight how a warrant ties the inference/claim/hypothesis/recommendation about the size of the problem to the evidence.
v) Transition - Both the evidence and the warrant need to be reliable for the inference to be reliable. So as we go forward with sizing-up MRSA we'll think about both the evidence and warrants explicitly.

4) BRAINSTORM – kinds of evidence and warrants for sizing-up MRSA
   a) Locate and project: Sizing-up MRSA prompts in the MRSA interactive notebook p ____.
      i) Note the kinds of information the characters used to size up the virus in the movie trailer
   b) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   c) Play Contagion trailer. Up to 'That's where we're headed!' at about 1:35.
      i) http://www.movieweb.com/news/contagion-trailer
   d) Whole Class discussion–
      i) Invite student to share responses to the video prompt
      ii) Probe for kinds of information (evidence).
   e) Locate and project: Sizing-up MRSA prompts in the MRSA interactive notebook p ____.
      i) How might you size-up MRSA? What kinds of information would help you decide whether to ignore MRSA, worry about MRSA, take action about MRSA or make responding to MRSA a high priority? What kinds of information might you use? Why?
   f) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   g) Individual work
   h) Pair discussion - monitor and support. Also, not interesting responses for whole class discussion.
   i) Whole Class discussion–
      i) Invite student to share responses to the brainstorm prompt
      ii) Probe for both kinds of information (evidence) and for why the information is important
      iii) Chart on the evidence and warrant poster (we'll need this poster for a couple days and perhaps again at the end)

5) Identifying Evidence
   a) Locate and project: Sizing-up MRSA prompts in the MRSA interactive notebook p ____.
   b) Note the kinds of information the characters used to size up the virus in the movie trailer
   c) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed. Invite students to share ideas about how to note information so they can find it again.
   d) Form small groups

6) CLOSURE

a) Summary of day - Today we brainstormed the kind of information we would need to size up MRSA. We also brainstormed why that information would be helpful. We uncovered both kinds of evidences and warrants for sizing-up MRSA.
b) Preview of next day - Tomorrow, we will organize the evidence and create a recommendation for ourselves about the relevance of MRSA – who should care about MRSA and how much?
c) Collect materials
    i) The MRSA interactive notebook and MRSA Inquiry notebooks.

Sizing-up MRSA

Lesson 8

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall, Evidence and Warrants posters (NEW)
Grouping: individual, pairs, groups of 4 (and as needed groups of 3), whole class
Lesson Steps

1) GOALS
   a) Build knowledge of how to size up a scientific problem
   b) Build knowledge about advancing a scientific claim with evidence and warrants.
   c) Build student knowledge of the development of the MRSA epidemic (integrations of ideas and language acquisition)

2) Set up
   a) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list, evidence and warrants poster (for sizing-up MRSA)
   b) Pass out MRSA materials to each student
3) WARM-UP – Brainstorming VISUAL REPRESENTATIONS for organizing the evidence for sizing-up MRSA.
   a) Review Previous work: Yesterday, We identified a lot of kinds of information from the two articles about how MRSA infection occurs.
   b) Preview agenda: Today we'll organize that information. Then we'll compose written recommendations to ourselves about the relevance of MRSA.
   c) Locate and project: Lesson 8 Warm-up prompt
      i) What kinds of visual representation might help organize the information about how MRSA is transmitted and how MRSA infection occurs into a model for how MRSA infection occurs?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   e) Individual work time – monitor and support
   f) Form pairs
   g) Ask pairs to take turns sharing ideas and adding peers good ideas to their own responses
   h) Whole class discussion
      i) Ask students to share ideas about visual representations for MRSA infection model.
      ii) Chart student on a whiteboard or the like.
      iii) Probe for clarify questions about kinds of visualizations students have proposed.
   i) Transition: We just created a list of ways we might organize the evidence for sizing up MRSA. Next we'll actually go ahead and organize the evidence.

4) FORMING VISUAL REPRESENTATIONS of Evidence for Sizing-up MRSA
   a) Locate and project: Visual Representations of Evidence for sizing-up MRSA small group prompt
      i) Create a visual representation of the evidence for sizing-up MRSA
   b) Ask students to read and clarify the prompts with partner. Check for understanding. Clarify as needed.
   c) Re-form small groups from preceding day
   d) Small group work – monitor and support small groups – note interesting challenges, responses, and emerging exemplars.
   e) Cross group sharing
      i) Locate and project: Visual Representations of Evidence for Sizing-up MRSA Cross group sharing prompts.
         (1) This is your opportunity to get and give feedback with peers to help each other improve your visual representation of the evidence.
            (a) Each group takes a few minutes to show and explain your visual representation.
            (b) Listeners take a turn to share:
               (i) What is clear?
               (ii) What is unclear or misrepresented?
               (iii) What is missing?
               (iv) What does not belong?
      ii) Ask students to read and clarify the prompts with partner. Check for understanding. Clarify as needed.
      iii) Form pairs of small groups for cross group discussion.
      iv) Cross group talking – monitor and support small groups – note interesting challenges, responses, and emerging exemplars.

5) COMPOSING A MULTIPLE TEXT ARGUMENTATION – Sizing-up MRSA
   a) Locate and project: Sizing-up MRSA Ourselves individual prompt
      i) Write a scientific recommendation to yourself. Personally, for you, what level of response is appropriate for MRSA? Why? On what evidence and warrants did you base your recommendation?
   b) Ask students to read and clarify the prompts with partner. Check for understanding. Clarify as needed.
   c) Individual work - monitor and support
   d) Locate and project: Sizing-up MRSA Ourselves individual prompt
      i) Take turns share your own personal scientific recommendation and the evidences and warrants you valued.
      ii) As a group develop consensus scientific recommendation for your group. Make sure you support your claim with evidences and makes sure you have warrants the for why the evidence is relevant.
      iii) The next page is available for composing your consensus scientific recommendation.
   e) Ask students to read and clarify the prompts with partner. Check for understanding. Clarify as needed.
   f) Re-form small groups that collaborated informing visual representations of the evidence.
   g) Small group work – monitor and support small groups – note interesting challenges, responses, and emerging exemplars.

6) Closure
   a) Summary of day - Today we organized the evidence for sizing up MRSA and wrote evidence based recommendations for about the relevance of MRSA to ourselves.
   b) Preview of next day - Tomorrow, we will give and get feedback from our peers about our recommendations and reflect on our own learning.
   c) Collect materials
      i) The MRSA interactive notebooks and MRSA Inquiry notebooks.

Sizing-up MRSA

Lesson 9

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall, Evidence and Warrants posters (NEW), paper for Sizing-up MRSA posters for student groups

Grouping: individual, pairs, groups of 4 (and as needed groups of 3), whole class

Lesson Steps

1) GOALS
   a) Build knowledge of how to size up a scientific problem
   b) Build knowledge about advancing a scientific claim with evidence and warrants.
   c) Build student knowledge of the development of the MRSA epidemic (integrations of ideas and language acquisition)

2) Set up
   a) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list, evidence and warrants poster (for sizing-up MRSA)
   b) Pass out MRSA materials to each student

3) WARM-UP
   a) Review previous: Yesterday we developed visual representation of the evidence for sizing-up MRSA and written recommendation about the relevance of MRSA
   b) Preview agenda: Today we will 'publish' our work on posters and learn together more about MRSA and more about forming own our models of science processes.
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) Respond to any two of the following prompts.
         (1) What is one part of your work on sizing up MRSA that you are proud of? Why?
         (2) What was challenging about organizing the evidence or writing the recommendation? How did you resolve the challenge?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   e) Ask students to respond to the prompt,
   f) Individual thinking and writing. Monitor and support students.
   g) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for 60 seconds each.
   h) Whole class discussion
      i) Ask students for their ideas. Probe for metacognition and elements of reasoning & argumentation
   i) Transition: Thinking about our own work is one way to learn. Reading and thinking about others work is another. The gallery walk will help us do that.

4) IDENTIFYING ARGUMENTS EXEMPLARS with a Science Seminar
   a) Small group work making poster
      i) Locate, project prompts in the Sizing-up MRSA Posters small group prompt in interactive notebook p ____.
         (1) Make a poster that displays both the visual representation of the evidence for sizing-up MRSA and written representations of your group's consensus scientific recommendation.
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
      iii) Group Work - Monitor and support – note exemplars in preparation of whole class discussion, facilitating posting the posters
   b) Gallery walk with sticky notes –model and support reading and note taking
      i) Locate, project prompts in the Sizing-up MRSA Posters small group prompt in interactive notebook p ____.
         (1) Travel from poster to poster with your group. At each poster, read and discuss the model.
         (2) Make notes for each poster about:
            (a) What is clear or unclear?
            (b) What is unclear or misrepresented?
            (c) What is missing?
            (d) What is does not belong?
            (e) What commonalities and differences do you notice?
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   c) Whole class discussion
      i) Invite students to share an observation, connection, thought, question or insights about posters they read.
      ii) Probe for evidence organization and argumentation exemplars and why they are good.

7) CONCEPTUAL CHANGE and INQUIRY QUESTIONS – update notebook with new thoughts about MRSA
   a) Locate the Inquiry Questions prompts in the interactive notebook p____ .
      i) Individual
         (1) Locate your inquiry notetaker
         (2) Add today's date and activity (Sizing-up MRSA Science Seminar) to the date and source column.
         (3) Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions.
         (4) In the evidence column note the evidence from the texts that support the new ideas or spark the questions.

b) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
c) Locate inquiry notetaker.
d) Model drawing line below preceding entry and adding today's date and article titles to left hand (date & source) column.
e) Ask students to do likewise.
f) Individual writing. Monitor and support
g) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
h) Pairs discussion
i) Whole class discussion.
   i) Ask students/pairs to share one best new idea about the inquiry questions.
   ii) Invite student to add good ideas from their peers into their own notebook.
   iii) Probe for multiple voices, multiple perspectives and text evidence.

5) Closure
   a) Summary of the day: Today we gave and got feedback about our evidence representations/organization and our recommendations. We identified exemplars and reflected on our own learning.
   b) Preview of next day: Tomorrow we'll read a couple new texts about MRSA. Our inquiry focus will shift back from the relevance question toward causation question.
   c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

How SA became MRSA

Lesson 10

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall, (optional) make copies of an excerpt from your textbook on the mechanism of natural selection.

Grouping: individual, pairs, whole class

Lesson Steps

1) GOALS
   a) Build schema for science based recommendations that the recommendations must be warranted by the science
   b) Build knowledge about the selective pressure of antibiotics, the evolution of antibiotic resistance in SA (becoming MRSA)
   c) Build knowledge for reading science models and constructing cohesive science models
   d) Building knowledge of how to preview texts and set own reading process/purpose

2) Set up
   a) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list
   b) Pass out MRSA materials to each student

3) WARM-UP
   a) Review previous day: Yesterday, we gave and got feedback about our evidence representations/organization and our recommendations. We identified exemplars and reflected on our own learning.
   b) Preview today: Today, we'll read a couple new texts about MRSA. Our inquiry focus will shift back from the relevance question toward causation question.
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) MRSA is on the increase in the community and MRSA causes serious disease. But what caused Staphylococcus aureus (SA) to become methicillin-resistant Staphylococcus aureus (MRSA).
         (1) What do you know, think or wonder about the how SA became MRSA?
         (2) Why might it be important to know how SA became MRSA?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   e) Ask students to respond to the prompt,
   f) Individual thinking and writing. Monitor and support students.
   g) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for 60 seconds each.
   h) Whole class discussion
      i) Ask students for their ideas. Probe for schema for science based recommendations that the recommendations must be warranted by the science.

4) CLOSE READING
   a) Transition: Understanding how SA became MRSA is important for imagining how to limit the impact of MRSA. We will focus on how to make sense of models and how to form a science model for how SA became MRSA as we read today's three texts.
   b) READING PREVIEW
      i) Locate and project: Reading Preview prompts in the MRSA interactive notebook p ____.
         (1) Take two minutes to look over the next two texts: Battling Bacterial Evolution: the Work of Carl Bergstrom, and Modification by Natural Selection (or the textbook excerpt identified by your teacher).
            (a) What might be interesting about reading these texts?
            (b) What might be challenging about reading these texts?
            (c) What is one thing you can do while you read to handle the challenge?
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
      iii) Locate Battling Bacterial Evolution and Modification by Natural Selection* in the MRSA interactive notebook p ___.* Optional-- substitute instead of Modification by Natural selection an excerpt here from your textbook on the mechanism of natural selection.
      iv) Individual preview. Monitor and support.
      v) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
      vi) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for one minute each.
      vii) Whole class discussion
         (1) Ask students to share challenges and interests? Probe for commonalities and differences. (Use an equitable sharing protocol)

c) READING INQUIRY
   i) Teacher MODEL
      (1) Locate and project: Science Model Reading Inquiry prompts in the MRSA interactive notebook p ____. Also locate *Battling Bacterial Evolution*
      (2) Ask students to read and clarify the 'teacher model' prompt with partner. Check for understanding. Clarify as needed.
      (3) Teacher Model making thinking visible with Think Aloud with *Battling Bacterial Evolution*
      (4) Ask students what they noticed in the teacher Think Aloud model
   ii) THINK ALOUD
      (1) Ask students to read and clarify the pairs prompt with partner. Check for understanding. Clarify as needed. Model with Think Aloud, if clarification need is acute.
      (2) Pairs Think aloud. Monitor and support.
   iii) Whole group discussion of reading process for reading this text.
      (1) Invite students to share reading processes that helped a lot reading this text.
      (2) Add to reading strategy list.
   iv) Repeat Reading Inquiry with MRSA *History* and *Modification by Natural Selection* (or with the substitute text from class textbook).
      (1) In the whole class discussions probe for:
         (a) Any differences and similarities they noticed between the texts.
         (b) how and why they read each text differently or similarly
      (2) Add to the reading strategy list.

5) CONCEPTUAL CHANGE and INQUIRY QUESTIONS – update notebook with new thoughts about MRSA
   a) Locate the Inquiry Questions prompts in the interactive notebook p____ .
      i) Individual
         (1) Locate your inquiry notetaker
         (2) Add today's date and article titles to the date and source column.
         (3) Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions.
         (4) In the evidence column note the evidence from the texts that support the new ideas or spark the questions.
   b) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
   c) Locate inquiry notetaker.
   d) Model drawing line below preceding entry and adding today's date and article titles to left hand (date & source) column.
   e) Ask students to do likewise.
   f) Individual writing. Monitor and support
   g) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
   h) Pairs discussion
   i) Whole class discussion.
      i) Ask students/pairs to share one best new idea about the inquiry questions.
      ii) Invite student to add good ideas from their peers into their own notebook.
      iii) Probe for multiple voices, multiple perspectives and text evidence.

6) CLOSURE
   a) Summary of day: Today we read and discussed three texts about MRSA. We also discussed how we make sense of models we read about in texts.
   b) Preview of next day: Tomorrow, we will read two more texts about how SA became MRSA keeping focused our questions about the cause(s) of MRSA.
   c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

How SA became MRSA

Lesson 11

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall,

Grouping: individual, pairs, whole class

Lesson Steps

1) GOALS
   a) Build knowledge about the selective pressure of antibiotics, the evolution of antibiotic resistance in SA (becoming MRSA)
   b) Build knowledge for reading science models and constructing cohesive science models while reading
   c) Building knowledge of how to preview texts and set own reading process/purpose

2) Set up
   a) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list
   b) Pass out MRSA materials to each student

3) WARM-UP (reading preview)
   a) Review previous: Yesterday we gave and got feedback about our evidence representations/organization and our recommendations. We identified exemplars and reflected on our own learning about the MRSA inquiry questions.
   b) Preview agenda: Today we continue to focus on understanding how SA became MRSA. We will read two texts and consider how we make sense of science models in texts.
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) Take two minutes to look over the next two texts: Natural Selection and Antibiotic Resistance, and Growth and Reproduction.
         (1) What might be interesting about reading these texts?
         (2) What might be challenging about reading these texts?
         (3) What is one thing you can do while you read to handle the challenge?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   e) Ask students to respond to the prompt,
   f) Individual thinking and writing. Monitor and support students.
   g) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for 60 seconds each.
   h) Whole class discussion
      i) Ask students for their ideas. Probe for ideas about interests, challenges. Also probe for the reading processes students plan to employ and why they plan to do so. – that is, what in the text prompts them to do so.

4) CLOSE READING
   a) Transition: Understanding how SA became MRSA is important for imagining how to limit the impact of MRSA. So, similar to yesterday, we will focus on how to make sense of models and how to form a science model for how SA became MRSA as we read the today's two texts.
   b) READING INQUIRY
      i) Teacher MODEL
         (1) Locate and project: Science Model Reading Inquiry prompts in the MRSA interactive notebook p ____. Also locate *Growth and Reproduction*
         (2) Ask students to read and clarify the 'teacher model' prompt with partner. Check for understanding. Clarify as needed.
         (3) Teacher Model making thinking visible with Think Aloud with *Growth and Reproduction – focus of modeling is forming a visual model of the 'theoretical processes described in the text, just begin the work so student may explore their own ways of visualizing the text'*
         (4) Ask students what they noticed in the teacher Think Aloud model
      ii) THINK ALOUD
         (1) Ask students to read and clarify the pairs prompt with partner. Check for understanding. Clarify as needed. Model with Think Aloud, if clarification need is acute.
         (2) Pairs Think aloud. Monitor and support.
      iii) Whole group discussion of reading process for reading bar graph.
         (1) Invite students to share reading processes that helped a lot reading this graph.
         (2) Add to reading strategy list.
      iv) Repeat Reading Inquiry with *Natural Selection and Antibiotic Resistance*.
         (1) In the whole class discussions probe for:
            (a) Any differences and similarities they noticed between the texts.
            (b) how and why they read each text differently or similarly
         (2) Add to the reading strategy list.

5) CONCEPTUAL CHANGE and INQUIRY QUESTIONS – update notebook with new thoughts about MRSA
   a) Locate the Inquiry Questions prompts in the interactive notebook p____ .
      i) Individual
         (1) Locate your inquiry notetaker
         (2) Add today's date and article titles to the date and source column.
         (3) Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions.
         (4) In the evidence column note the evidence from the texts that support the new ideas or spark the questions.
   b) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
   c) Locate inquiry notetaker.
   d) Model drawing line below preceding entry and adding today's date and article titles to left hand (date & source) column.
   e) Ask students to do likewise.
   f) Individual writing. Monitor and support
   g) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
   h) Pairs discussion
   i) Whole class discussion.
      i) Ask students/pairs to share one best new idea about the inquiry questions.
      ii) Invite student to add good ideas from their peers into their own notebook.
      iii) Probe for multiple voices, multiple perspectives and text evidence.

6) Identifying Evidence
   a) Locate and project: Identifying Evidence – How SA became MRSA prompts in the MRSA interactive notebook p ____.
   b) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
   c) Form small groups with two pairs within each group
   d) Small group work: monitor and support – prompt groups to shift from pair work to small group work.
   e) Whole group discussion
      i) Ask student what they noticed about the process of identifying evidence.
         (1) Probe for any challenges they encountered and how they resolved them.

7) CLOSURE
   a) Summary of day: Today we continued to focus on understanding how SA became MRSA. We will read two texts and consider how we make sense of science models in texts. We also gathered evidence for how SA became MRSA.
   b) Preview of next day: Tomorrow, we form models accounting for our evidence about how SA became MRSA.
   c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

How SA became MRSA

Lesson 12

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall

Grouping: individual, pairs, whole class

Lesson Steps

1) GOALS
   a) Build cohesion of knowledge about the selective pressure of antibiotics, the evolution of antibiotic resistance in SA (becoming MRSA)
   b) Build knowledge for forming logically cohesive science models

2) Set up
   a) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list
   b) Pass out MRSA materials to each student

3) WARM-UP
   a) Review previous: Yesterday we focused on understanding how SA became MRSA. We read two texts and consider how we make sense of science models in texts. We also gathered evidence for how Sa became MRSA.
   b) Preview agenda: Today we form visual and written models for how SA became MRSA.
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) What kinds of visual representations might help organize the information into a model explaining how SA became MRSA?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   e) Ask students to respond to the prompt,
   f) Individual thinking and writing. Monitor and support students.
   g) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for 60 seconds each.
   h) Whole class discussion
      i) Ask students for their ideas. Ask students to respond to their peers suggests. Probe for commonalities, differences and good ideas they notice from their peers.

4) FORMING VISUAL REPRESENTATIONS for MODELS of how SA became MRSA
   a) Transition: "We identified a lot of information from the two articles about how SA became MRSA. Now we'll want to organize that information into a model that explains how SA became MRSA. We'll start by creating visual representations of a model of how SA became MRSA. Then we'll compose written representations for our models. We'll take time to consider each others' models and find exemplars to uncover what makes a science model good.
   b) Draft Visual Model Creation
      i) Locate and project: Visual Representations of how SA became MRSA small group prompt
         (1) Create a visual representation of a model explaining how SA became MRSA
      ii) Ask students to read and clarify the prompts with partner. Check for understanding. Clarify as needed.
      iii) Form small groups
      iv) Small group work – monitor and support small groups – note interesting challenges, responses, and emerging exemplars.
   c) Peer Review
      i) Locate and project: Visual Representations for MRSA Infection Model Cross group sharing prompts
         (1) This is your opportunity to get and give feedback to peers and help each other improve your visual models.
            (a) Each group takes a few minutes to show and explain their visual representation.
            (b) Listeners take a turn to share:
               (i) What is clear in the visual model?
               (ii) What is unclear or misrepresented in the visual model?
               (iii) What is missing from the visual model?
               (iv) What does not belong in the visual model?
      ii) Ask students to read and clarify the prompts with partner. Check for understanding. Clarify as needed.
      iii) Form pairs of small groups for cross group discussion.
      iv) Cross group talking – monitor and support small groups – note interesting challenges, responses, and emerging exemplars.

5) COMPOSING WRITTEN REPRESENTATIONS for MODELS of how SA became MRSA
   a) Transition: "Visual representations such as charts, graphs, diagrams, equations and tables are huge in science. Visuals communicate ideas more effectively than words alone. But visuals alone can be puzzling. So, visuals are generally paired with words --- word incorporated into the visual (as in many of our models of how SA became MRSA), Titles and captions above and below the visual and exposition nearby the visual (as in our textbooks). We are going to focus next on composing words to work with our visuals in representing a model of how SA became MRSA"
   b) Locate and project: Written Representations for how SA became MRSA Model small group prompts
      i) Compose a written representation of your model explaining how SA became MRSA
   c) Ask students to read and clarify the prompts with partner. Check for understanding. Clarify as needed.
   d) Small group work

6) CLOSURE
   a) Summary of day: Today we created visual and written representations of a model for how SA became MRSA.
   b) Preview of next day: Tomorrow, we will 'publish' our work on posters and learn together more about MRSA and more about forming own our models of science processes.
   c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

How SA became MRSA

Lesson 13

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall, poster paper for how SA became MRSA posters for student groups

Grouping: individual, pairs, groups of 4 (and as needed groups of 3), whole class

Lesson Steps

1) GOALS
   a) Build cohesion of knowledge about the selective pressure of antibiotics, the evolution of antibiotic resistance in SA (becoming MRSA)
   b) Build knowledge for forming logically cohesive science models

2) Set up
   a) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list
   b) Pass out MRSA materials to each student

3) WARM-UP
   a) Review previous: Yesterday we developed visual and written representations of how SA became MRSA
   b) Preview agenda: Today we will 'publish' our work on posters and learn together more about MRSA and more about forming own our models of science processes.
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) Respond to any two of the following prompts.
         (1) What is one part of your work on how SA became MRSA that you are proud of? Why?
         (2) What was challenging about creating the visual or written representation of a model of how RSA became MRSA? How did you resolve the challenge?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   e) Ask students to respond to the prompt,
   f) Individual thinking and writing. Monitor and support students.
   g) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for 60 seconds each.
   h) Whole class discussion
      i) Ask students for their ideas. Probe for metacognition and elements of reasoning & argumentation
   i) Transition: Thinking about our own work is one way to learn. Reading and thinking about others work is another. The gallery walk will help us do that.

4) IDENTIFYING ARGUMENTS EXEMPLARS with a Science Seminar
   a) Small group work making poster
      i) Locate, project prompts in the Sizing-up MRSA Posters small group prompt in interactive notebook p ____.
         (1) *Make a poster that displays both the visual and written representations of your group's model explaining how SA became MRSA*.
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
      iii) Group Work - Monitor and support – note exemplars in preparation of whole class discussion, facilitating posting the posters
   b) Gallery walk with sticky notes –model and support reading and note taking
      i) Locate, project prompts in the Sizing-up MRSA Posters small group prompt in interactive notebook p ____.
         (1) Travel from poster to poster with your group. At each poster, read and discuss the model.
         (2) Make notes for each poster about:
            (a) What is clear or unclear?
            (b) What is unclear or misrepresented?
            (c) What is missing?
            (d) What is does not belong?
            (e) What commonalities and differences do you notice?
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   c) Whole class discussion
      i) Invite students to share an observation, connection, thought, question or insights about posters they read.
      ii) Probe for evidence organization and argumentation exemplars and why they are good.

5) CONCEPTUAL CHANGE and INQUIRY QUESTIONS – update notebook with new thoughts about MRSA
   j) Locate the Inquiry Questions prompts in the interactive notebook p____ .
      i) Individual
         (1) Locate your inquiry notetaker
         (2) Add today's date and activity (Sizing-up MRSA Science Seminar) to the date and source column.
         (3) Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions.
         (4) In the evidence column note the evidence from the texts that support the new ideas or spark the questions.
   k) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
   l) Locate inquiry notetaker.
   m) Model drawing line below preceding entry and adding today's date and article titles to left hand (date & source) column.
   n) Ask students to do likewise.
   o) Individual writing. Monitor and support
   p) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
   q) Pairs discussion
   r) Whole class discussion.
      i) Ask students/pairs to share one best new idea about the inquiry questions.
      ii) Invite student to add good ideas from their peers into their own notebook.
      iii) Probe for multiple voices, multiple perspectives and text evidence.

6) Closure
   a) Summary of the day: Today we gave and got feedback about models for how SA became MRSA and our recommendations. We identified exemplars and reflected on our own learning.
   b) Preview of next day: Tomorrow we'll read a couple new texts about MRSA ecology. Our inquiry focus will shift back from the causation question to the prevention question.
   c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

'Preventing' MRSA

Lesson 14

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall,

Grouping: individual, pairs, whole class

Lesson Steps

1) GOALS
   a) Build schema for science based recommendations that the recommendations must be warranted by the science
   b) Build knowledge about MRSA ecology
   c) Build Building knowledge of how to preview texts and set own reading process/purpose

2) Set up
   a) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list
   b) Pass out MRSA materials to each student

3) WARM-UP
   a) Review previous day: Yesterday, we gave and got feedback about our models for how SA became MRSA. We identified exemplars and reflected on our own learning.
   b) Preview today: Today, we'll read a couple new texts about MRSA ecology. Our inquiry focus will shift to the prevention question.
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) MRSA is on the increase in the community and MRSA causes serious disease. But what caused Hospital Acquired methicillin-resistant Staphylococcus aureus (HA-MRSA) to become Community Acquired methicillin-resistant Staphylococcus aureus (CA-MRSA).
         (1) What do you know, think or wonder about the how HA-MRSA became CA-MRSA?
         (2) Why might it be important to know how HA-MRSA became CA-MRSA?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   e) Ask students to respond to the prompt,
   f) Individual thinking and writing. Monitor and support students.
   g) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for 60 seconds each.
   h) Whole class discussion
      i) Ask students for their ideas. Probe for schema for science based recommendations that the recommendations must be warranted by the science.

4) CLOSE READING
   a) Transition: Understanding how MRSA ecology is important for imagining how to limit the impact of MRSA.
   b) READING PREVIEW
      i) Locate and project: Reading Preview prompts in the MRSA interactive notebook p ____.
         (1) Take two minutes to look over the next three texts: Microbes and You, How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?, and Wash your Hands.
            (a) What might be interesting about reading these texts?
            (b) What might be challenging about reading these texts?
            (c) What is one thing you can do while you read to handle the challenge?
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
      iii) Locate Battling Bacterial Evolution and Modification by Natural Selection* in the MRSA interactive notebook p
      iv) Individual preview. Monitor and support.
      v) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
      vi) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for one minute each.
      vii) Whole class discussion
         (1) Ask students to share challenges and interests? Probe for commonalities and differences. (Use an equitable sharing protocol)

c) READING INQUIRY
   i) Teacher MODEL (optional)
      (1) Locate and project: Science Model Reading Inquiry prompts in the MRSA interactive notebook p ____. Also locate *Battling Bacterial Evolution*
      (2) Ask students to read and clarify the 'teacher model' prompt with partner. Check for understanding. Clarify as needed.
      (3) Teacher Model making thinking visible with Think Aloud with *Microbes and You*
      (4) Ask students what they noticed in the teacher Think Aloud model
   ii) THINK ALOUD
      (1) Ask students to read and clarify the pairs prompt with partner. Check for understanding. Clarify as needed. Model with Think Aloud, if clarification need is acute.
      (2) Pairs Think aloud. Monitor and support.
   iii) Whole group discussion of reading process for reading this text.
      (1) Invite students to share reading processes that helped a lot reading this text.
      (2) Add to reading strategy list.
   iv) Repeat Reading Inquiry with the final two texts: *How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures? And Wash your Hands*
   v) In the whole class discussions probe for:
      (a) Any differences and similarities they noticed between the texts.
      (b) how and why they read each text differently or similarly
      (c) Add to the reading strategy list.

5) CONCEPTUAL CHANGE and INQUIRY QUESTIONS – update notebook with new thoughts about MRSA
   j) Locate the Inquiry Questions prompts in the interactive notebook p____ .
      i) Individual
         (1) Locate your inquiry notetaker
         (2) Add today's date and article titles to the date and source column.
         (3) Make notes in the interpretation column for new ideas and questions that you have about our MRSA inquiry questions.
         (4) In the evidence column note the evidence from the texts that support the new ideas or spark the questions.
   k) Ask students to read and clarify the prompt with partner. Check for understanding. Clarify as needed.
   l) Locate inquiry notetaker.
   m) Model drawing line below preceding entry and adding today's date and article titles to left hand (date & source) column.
   n) Ask students to do likewise.
   o) Individual writing. Monitor and support
   p) Ask students to read and clarify 'pairs' prompt with partner. Check for understanding. Clarify as needed.
   q) Pairs discussion
   r) Whole class discussion.
      i) Ask students/pairs to share one best new idea about the inquiry questions.
      ii) Invite student to add good ideas from their peers into their own notebook.
      iii) Probe for multiple voices, multiple perspectives and text evidence.

6) CLOSURE
   a) Summary of day: Today we read and discussed two texts about MRSA. We also discussed how we read these texts.
   b) Preview of next day: Tomorrow, identify problems in our community related to MRSA and form recommendations addressing these problems.
   c) Collect materials: The MRSA interactive notebooks and MRSA Inquiry notebooks.

'Preventing' MRSA

Lesson 15

Materials: MRSA interactive notebook and inquiry notebook, Concept Building posters for infect/infection, evolve/evolution, or antibiotic resistant /antibiotic resistance, reading strategies list poster, MRSA word-wall, poster paper for how MRSA recommendation posters for student groups

Grouping: individual, pairs, groups of 4 (and as needed groups of 3), whole class

Lesson Steps

1) GOALS
   a) Build cohesion of knowledge MRSA prevention
   b) Build knowledge for forming logically cohesive science models
   c) Build knowledge of science epistemology and inquiry – advancing claims (recommendations) by science argumentation

2) Set up
   a) Re-display posters: inquiry, concept building posters, MRSA word wall, reading strategies list
   b) Pass out MRSA materials to each student

3) WARM-UP
   a) Review previous: Yesterday we read and discussed two texts about MRSA. We also discussed how we read these texts.
   b) Preview agenda: Today we'll identify problems in our community related to MRSA and form recommendations addressing these problems.
   c) Locate and project: warm-up prompts in the MRSA interactive notebook p ____.
      i) Over the last couple weeks we studied about MRSA and made sense of the science. Now it is time to determine a course of action to limit the impact of MRSA. Brainstorm response for each of the following:
         (1) What course of action could limit the progress of MRSA and the progress of antibiotic resistance in MRSA?
         (2) Who would have to act to make a difference?
         (3) Who in your community needs to act?
         (4) What is likely to happen if people do not act?
   d) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   e) Ask students to respond to the prompt.
   f) Individual thinking and writing. Monitor and support students.
   g) Pair discussion: Form pairs and ask pairs to take turns sharing their ideas for 60 seconds each.
   h) Whole class discussion
      i) Ask students for their ideas. Ask students to respond to their peers suggests. Probe for commonalities, differences and good ideas they notice from their peers.
      ii) This is a moment of formative assessment. Have enough ideas be generated by the warm-up for the students to proceed?
         (1) If so the move on
         (2) If not, then add in supports to extend students thinking and writing.
            (a) For instance reviewing their own think aloud notes and inquiry notes to look for ideas about problems they have already thought of in earlier lessons.
         (3) The goal is for students to choose the problem and course of action. Resist 'saving' the students from grappling or 'delivering' them by giving them a better answer.

4) MRSA recommendation development (this section requires much fleshing out by the teacher)
   a) Locate project MRSA recommendations pages in interactive notebook p ____.
   b) Ask students to read and clarify pages with partner. Check for understanding. Clarify as needed.
      i) This will take a few minutes and students may need additional supports including pairs thinking aloud, chunking the text & process by reading each step/section and then moving to whole class clarifying discussion.
   c) Work time and process - to be negotiated between teacher and students
      i) The work time for the MRSA recommendation is long. Students may need multiple supports.
         (1) Chunk the process: Schedule a check in after each of the first three sections and leading into the next (identifying a problem, determining a course of action, and writing a scientific recommendation). Some processes would be peer review protocol, teacher check in with group, or whole class discussion.
      ii) Group Work - Monitor and support – note exemplars in preparation of whole class discussions, facilitating posting the posters

5) IDENTIFYING ARGUMENTS EXEMPLARS with a Science Seminar
   a) Gallery walk with sticky notes –model and support reading and note taking
      i) Locate, project prompts in the Sizing-up MRSA Posters small group prompt in interactive notebook p ____.
         (1) Travel from poster to poster with your group. At each poster, read and discuss the model.
         (2) Make notes for each poster about:
            (a) What is clear or unclear?
            (b) What is unclear or misrepresented?
            (c) What is missing?
            (d) What is does not belong?
            (e) What commonalities and differences do you notice?
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
   b) Whole class discussion
      i) Invite students to share an observation, connection, thought, question or insights about posters they read.
      ii) Probe for evidence organization and argumentation exemplars and why they are good.

6) Clarify if they will continue on to the recommendation to the target audience or if the MRSA inquiry ends with the poster.

7) Closure
   a) MRSA unit reflections
      i) Locate, project MRSA Inquiry Reflection prompts in interactive notebook p ____.
      ii) Ask students to read and clarify prompt with partner. Check for understanding. Clarify as needed.
      iii) Students write. Monitor and support.
   b) Teacher reflections on student learning
      i) Prepare comments about observation you've made indicating student learning and growth as well as and new learning interests the class/student's have uncovered.

Support Notes

Students often need supports to develop metacognition. The Think Aloud bookmarks can support students give voice to their thoughts about the reading process.

- Use the talk stems in strategic think aloud models and ask students to use them as guides when they listen to your model and when they describe what they noticed you doing
- Ask students to use the Think Aloud bookmarks while they think aloud so they have sentence starters to begin their thoughts.

Also teachers need support in learning how to keep metacognitive conversations progressing in the moment. The Questions to Elicit Student Thinking can help.

- Keep the list with you on a notebook as you facilitate the metacognitive conversation as a reminder of things you might say.

Think Aloud Bookmark

Questioning
- A question I have is …
- I wonder about …
- Could this mean …

Predicting
- I predict that …
- In the next part, I think …
- I think this is …

Picturing
- I can picture …
- I can see …

Making Connections
- This is like
- This reminds me of

Identifying a Problem
- I'm confused about …
- I'm not sure of …
- I didn't expect …

Summarizing
- So what it is saying is …
- The big idea here is …
- I think the point is …

Using Fix-Ups
- I'll re-read this
- I'll read on & check back

Think Aloud Bookmark

Questioning
- A question I have is …
- I wonder about …
- Could this mean …

Predicting
- I predict that …
- In the next part, I think …
- I think this is …

Picturing
- I can picture …
- I can see …

Making Connections
- This is like
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Think Aloud Bookmark

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- I think this is …

Picturing
- I can picture …
- I can see …

Making Connections
- This is like
- This reminds me of

Identifying a Problem
- I'm confused about …
- I'm not sure of …
- I didn't expect …

Summarizing
- So what it is saying is …
- The big idea here is …
- I think the point is …

Using Fix-Ups
- I'll re-read this
- I'll read on & check back

Think Aloud Bookmark

Questioning
- A question I have is …
- I wonder about …
- Could this mean …

Predicting
- I predict that …
- In the next part, I think …
- I think this is …

Picturing
- I can picture …
- I can see …

Making Connections
- This is like
- This reminds me of

Identifying a Problem
- I'm confused about …
- I'm not sure of …
- I didn't expect …

Summarizing
- So what it is saying is …
- The big idea here is …
- I think the point is …

Using Fix-Ups
- I'll re-read this
- I'll read on & check back

Questions to Elicit Student Thinking

Because so much classroom dialogue takes the form of teacher initiation/student response/teacher evaluation (IRE), students may be unpracticed in responding to questions that invite thinking rather than retrieving information. Be transparent about how you will help students collaboratively explore their thinking and the kinds of questions they should expect.

And respond nonjudgmentally, with a nod, a thank you, or a follow-up question. Your attentiveness will produce more conversation than your praise (or its obvious absence).

Invite Thinking. Ask questions that do not presume everyone has the same ideas.

- So…what do you think?
- What was especially interesting — for you?

Invite Confusion. Ask questions that encourage students to reveal their reading difficulties:

- How did you know that your understanding was breaking down?
- Can you point to certain places in the text where you lost comprehension?

Probe. As needed, help students share or uncover why they may have offered a particular answer.

- Help us understand your thinking on that.
- Can you tell us a little more?
- What in the text makes you say that?
- Can you give us an example?

Document. Record students' ideas so that they are easily available for others to respond to and to compare and connect.

Extend. Ask questions that explicitly focus students on responding to others' ideas and confusions.

- Does everyone agree?
- Did anyone else have a similar problem?
- What might be another way to look at that?

Link. Help students connect to previous learning and student thinking.

- How might this relate to…
- What connections come up for you?

Name _____ Date _____
Teacher _____

Date & Source(s)	Evidence	Interpretation

Date & Source(s)	Evidence	Interpretation

Date & Source(s)	Evidence	Interpretation

Date & Source(s)	Evidence	Interpretation

date _____

name _____

teacher _____

Introduction

Malaria is a serious disease in many parts of the world. It has many "causes" linked in a chain of events. Scientists try to prevent the disease by breaking links in the chain.

Task

1. Read the texts on the following pages and make notes in the margins about your reading, thinking and problem solving processes.

2. After you have read the texts, respond to the following, using information from your reading:

   A. Use the information in texts two, three and four to create a model, using visuals and words, that explains how malaria could cause millions of deaths each year in Africa. (You may add to the model in text 4, but yours may also look different).

   B. Based on what you know now, explain what might be done at different points to stop the transmission of malaria and use evidence from your reading to explain why these might work.

SPACE WILL BE PROVIDED AT THE END FOR YOU TO COMPLETE YOUR RESPONSES.

TEXT ONE

Introduction: The Malaria Problem

Malaria causes fever, joint pain, vomiting, seizures and can lead to brain damage and death, especially in children. On World Malaria Day in 2009, former President Clinton explained that "malaria was eliminated in the United States over a half a century ago, yet more than 1 million people around the world still die from the disease each year, making it one of the most pressing health challenges the world faces today."[1] According to the World Health Organization's 2011 report, there were 216 million cases of malaria and an estimated 655,000 deaths in 2010. [2] Most deaths occur among children living in Africa where a child dies every minute of malaria and the disease accounts for approximately 22% of all childhood deaths. The Clinton Foundation states, "despite … attention from the global community in recent years, the majority of African families are not benefitting from the tools necessary to stop malaria, such as bed nets and effective medicines, because of a lack of access or efficient use." [3]

1. April 24, 2009 | New York, Address given by Bill Clinton on ***World Malaria Day***
2. http://www.who.int/malaria/world_malaria_report_2011/en/
3. *2. http://www.clintonfoundation.org/what-we-do/clinton-health-access-initiative/our-approach/access-programs/malaria*

TEXT TWO

How is malaria spread?

Malaria is caused by *Plasmodium* bacterium. These parasites infect successively two different hosts: humans and female *Anopheles* mosquitoes.

The parasites are transmitted to people who are bitten by infected female *Anopheles* mosquitoes. In humans, *Plasmodium* multiplies in the liver and then invades the red blood cells. Successive generations of parasites grow inside the red cells and destroy them, releasing daughter parasites that continue the cycle by invading other red blood cells. These blood-stage parasites, called "gametocytes" (G. gamete + kytos, cell) cause the symptoms of malaria, which begin 6-10 days after infection.

When a female *Anopheles* mosquito bites an infected human, she takes the person's infected blood for a meal. During this meal, if gametocytes are picked up by the female mosquito, they may start another, different cycle of growth in the mosquito's gut. After 10-18 days, the parasites develop the infectious stage, called "sporozoites" (G. *sporos*, seed + *zōon*, animal), which reproduce in the mosquito's salivary glands.

When this infected *Anopheles* mosquito bites another human, the sporozoites are injected into the human's blood along with the mosquito's saliva. Thus the mosquito acts as a vector, transmitting the disease-causing parasite from one human to another.

Adapted from http://www.cdc.gov/malaria/about/biology/index.html and http://www.who.int/mediacentre/factsheets/fs094/en/

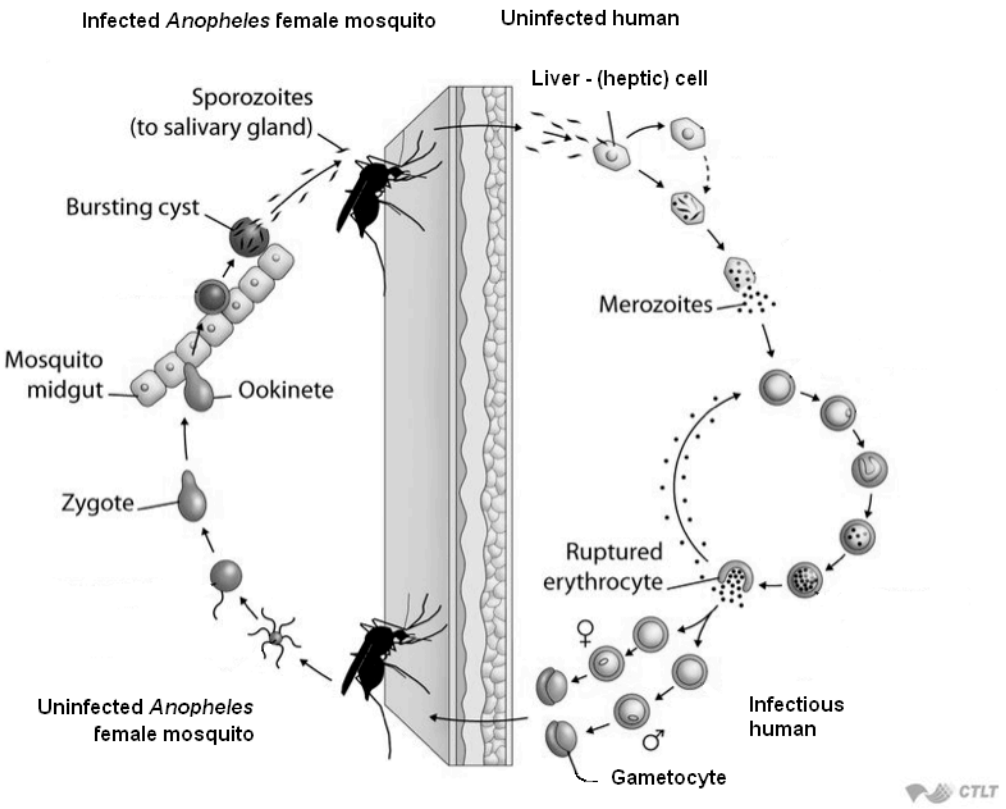
TEXT THREE

Ecology of Malaria

For malaria transmission to occur, three conditions must exist:

- Female *Anopheles* mosquitoes must be present, which are in contact with humans, and in which the parasites can complete half of their life cycle
- Humans must be present, who are in contact with the *Anopheles* mosquitoes, and in whom the malaria parasites can complete half of their life cycle
- Malaria parasites must be present.

TEXT FOUR



Life Cycle of Malaria parasite – Adapted from: http://ocw.jhsph.edu

2A. Use the information in texts two, three and four to create a model, using visuals and words, that explains how malaria could cause millions of deaths each year in Africa. (You may add to the model in text 4, but yours may also look different).

2B. Based on what you know now, explain what might be done at different points to stop the transmission of malaria and use evidence from your reading to explain why these might work.