PROJECT READi

Name _____ Date _____

Teacher _____

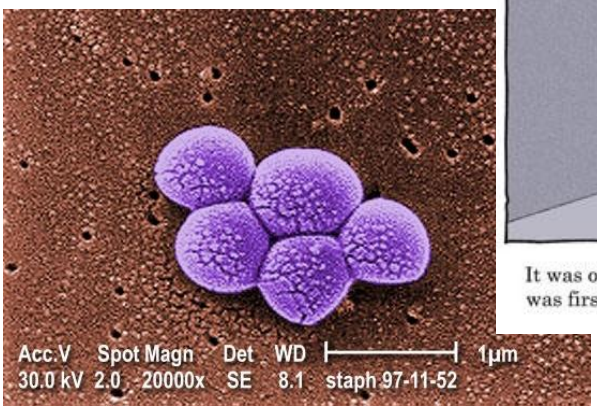
MRSA

Investigation

Infectious diseases on NBCNEWS.com

Doctors report 'alarming' rise of MRSA in kids

It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.



The intended use of these materials is in tandem with ongoing professional development focused on supporting reading as scientific practice. This work is funded by the Reading for Understanding Initiative of the Institute for Education Sciences, U.S. Department of Education, through Grant R305F100007 to University of Illinois at Chicago. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

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MRSA Investigation

MRSA is a serious threat to the public. Scientists have studied this deadly infection for many years because it is an important public health issue. MRSA is also a significant scientific puzzle, because many of the treatments used to cure MRSA infections work less well now than they did forty, twenty, ten, or even five years ago.

One goal for the MRSA investigation is to make sense of the MRSA phenomena through creating explanatory scientific models for how it emerges and spreads.
A second goal for our investigation into MRSA is to determine the best measures (or courses of action) to manage the public health challenge presented by the infection, and to share what we have learned with our community.

Our third goal is to uncover powerful practices for reading science texts for the purpose of construction and critique of scientific models – in essence reading, talking, listening and writing scientifically.

This MRSA investigation has four phases:

- Infection and transmission of MRSA
- Spread of MRSA
- Evolution of SA to MRSA
- Managing the public health challenge of MRSA

Each phase includes texts to read and make sense of, group and class discussion, and construction and critique of science explanatory models or science recommendations.

MRSA Infection
Beginning With What We Know, Think, and Wonder

Individual think-write

What do you know, think, possibly remember, guess at or wonder about **any two** of the following terms?

bacteria	infection	antibiotic
antibiotic resistance	MRSA	evolution

Pair discussion

- Take turns sharing your ideas for one minute each.
- Add partner's ideas to your chart.
- **Stellar idea**: Select one idea that you or your partner can share with the class. Mark it with a star.

Whole class sharing of our initial thoughts

- Share stellar ideas.
- Listen closely.
- Use science talk stems.
- Add peers' ideas to your chart.

MRSA Infection
MRSA in the News

Reading as inquiry: In the MRSA investigation, our reading supports development of science-reading savvy and building science knowledge. Whenever we read, we'll make our thinking visible so we can consider together how we read science and learn from each other. After we read we'll discuss how we read the text and work through any challenges the text presents. We will record the science reading process that we use on our class science reading strategies list, updating it as we read different texts. We will also discuss what we are noticing and thinking about **MRSA**, **antibiotic resistance** and **evolution**. We will use evidence and interpretation notetakers and posters to keep track of our ideas each time we read.

Individual think-write: preview

- Locate the reading strategy list, and the texts "Superbug MRSA Worries Doctors, Athletes," and "Kansas City Teen Gets MRSA from Attempted Lip Piercing, Almost Dies" (MRSA Reader pages R1-4).
- Take two minutes to look over the two texts and respond to the prompts below.
  - What might be challenging about reading these two articles?
  - What might be interesting about reading these two articles?
  - What kind of sources are these?
  - What kind of science information might they contain about MRSA?
  - What might you do to get the most out of the reading this article as possible?

Pair discussion

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.
- **Stellar idea**: Select one response that you or your partner can share with the class. Mark it with a star.

Whole class discussion

- Share stellar ideas.
- Listen closely and respond to your peers ideas.
- Use science talk stems.
- Add peers' best ideas onto your own response.

MRSA in the News

Teacher model

- Locate your science reading stems.
- Locate "Kansas City Teen," and "Superbug MRSA Worries Doctors, Athletes," (R1-R2).
- Listen and make notes below about the teacher's reading process.

Whole class discussion

- What did you notice about how your teacher read the science text?
- What are some science reading processes that you noticed?
- Which were new or particularly useful for this text?
- What additions or revisions can we make on the reading strategies list poster?

Reading and making thinking visible

- **Think Aloud:** Partners take turns thinking aloud by paragraph for the first section. One partner thinks aloud while the other partner makes notes in the margin of the text about their partner's thoughts. Help each other make sense of the text.

OR

- **Talk to the Text:** Individually talk to the text on the first section. Pairs take turns sharing their talk to the text comments. Help each other make sense of the text.
- Use the science reading stems to help you share your reading process.

Pair discussion

After reading discuss and respond to the prompts.

- **Words:** What new words or word-uses did you encounter? How did you make sense of their meaning?
- **Confusions or clarifications**: What parts of the text were unclear? Where do you have questions? Work together to clarify confusing parts of the text and to answer questions that you have.
- **Reading process:** What other science reading processes were important for your reading?
- **Inquiry:** What are you noticing or wondering now about MRSA, antibiotic resistance or evolution? What is interesting? What is important?
- **Stellar ideas:** Select a new word, a confusion or clarification, or a reading process AND one idea or question about MRSA, antibiotic resistance or evolution that you or your partner can share with the class. Mark them on your text with a star.

Whole class discussion

- Share a new word, confusion or clarification, or a reading process.
- Which reading strategies helped make sense of the text?
- What additions or revisions can we make on the reading strategies list poster?
- Share new ideas about MRSA, antibiotic resistance and evolution.
- What ideas and questions can we add to the evidence interpretation posters for MRSA, antibiotic resistance and evolution?
- What new words can we add to our word wall?

Repeat above steps for remaining sections of "Superbug MRSA Worries Doctors, Athletes" and for "Kansas City Teen Gets MRSA from Attempted Lip Piercing, Almost Dies."

MRSA Infection
Living and Learning

Individual think-write

Respond to either 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 suddenly noticing that word appearing everywhere? What was the word? When did you learn it? Where do you then recall noticing it? How do you account for the phenomena?

Pair discussion

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.
- **Stellar idea**: Select one response that you or your partner can share with the class. Mark it with a star.

Whole class discussion

- Share stellar ideas about word learning.
- Listen closely.
- Use science talk stems.
- Add great ideas from your peers to your own response.

MRSA Infection
MRSA in Our Homes

Individual think-write: preview

- Locate your science reading stems.
- Locate: *"How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?"* (pages R5-6)
- Take two minutes to look over the text and respond to the prompts below.
    - What might be challenging about reading this article?
    - What might be interesting about reading this article?
    - What kind of text is this? How do you know?
    - What predictions can you make about the kind of science information it may contain and how it might inform our investigation of MRSA?
    - What might you do to get as much as you can from reading this article?

Pair discussion

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.
- **Stellar idea**: Select one response that you or your partner can share with the class. Mark it with a star.

Whole class discussion

- Share stellar ideas.
- Listen closely and respond to your peers ideas.
- Use science talk stems.
- Add peers' best ideas onto your own response.

MRSA in Our Homes

Survival words: There are many words, terms and symbols that are used only in science, or that have particular meanings in science texts. Developing your own savvy for dealing with new words while reading – predicting which new words will be the most valuable to focus on learning and having strategies for learning in them while reading – is invaluable for science reading and science knowledge-building.

Teacher model

- Listen and make notes below about the teacher's reading process.
- The text for the teacher model is not a source of information for MRSA investigation.

> **Methanotrophic bacteria occupy benthic microbial mats in shallow marine hydrocarbon seeps, Coal Oil Point, California**
>
> Microbial mats composed of giant sulfur bacteria are observed throughout the benthos along continental margins. These communities serve to oxidize dissolved sulfides to sulfate, and are typically associated with the recent exposure of sulfide-rich sediments. Such mats are also ubiquitous in areas of hydrocarbon seepage, where they are thought to consume sulfide generated in underlying sediment. Despite the high abundance of dissolved methane in hydrocarbon seeps, few studies have considered the importance of methanotrophy in mat communities.
> Source: Ding, H., and D. L. Valentine (2008), Methanotrophic bacteria occupy benthic microbial mats in shallow marine hydrocarbon seeps, Coal Oil Point, California, J. Geophys. Res., 113, G01015, doi: 10.1029/2007JG000537.

Whole class discussion

- What did you notice about how your teacher handled new words while reading?

MRSA in Our Homes

Individual reading

Note new words.

- Locate: "How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?" (pages R5-6)
- Underline words in the text that are **new to you** or are **familiar but used in unfamiliar ways.**
- Circle any of these words that you predict that will need to understand in order to understand the main ideas of the text. These are your **survival words** for this text.

Pair discussion

Take turns sharing your own survival words and your reading processes.

- **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 word's meaning to understand the main ideas of the text?
- **Stellar idea:** Select one survival word that you or your partner can share with the class. Mark it with a star. Be ready to explain why you picked it and why you decided that it was an important word for this text.

Whole class discussion

- Share survival words and reasons for picking them.
- Help clarify the meaning of your peers' survival words if you already know them.
- If you uncover new survival words circle them in the text, or if you learn what they mean *in this text* make a note on the text.
- Which reading strategies helped in deciding which words are worth understanding?
- What additions or revisions can we make on the reading strategies list poster?

MRSA in Our Homes

Reading and making thinking visible

- **Think Aloud:** Partners take turns thinking aloud by paragraph with "How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?" One partner thinks aloud and the other partner makes notes in the margin about their partner's thoughts.

OR

- **Talk to the Text:** Individually talk to the text on *"How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?"* Pairs take turns sharing their talk to the text comments paragraph by paragraph.
- Help each other figure out what the survival words mean in this text.

Pair discussion

- **Reading process:** What science reading processes were important for your reading?
- **Inquiry:** What are you noticing or wondering now about MRSA, antibiotic resistance or evolution? What is interesting? What is important?
- **Stellar ideas**
    - Select one survival word or science reading process that you or your partner can share with the class. Mark it with a star. Be ready to tell what you or your partner did, where in the reading/text you did it and how it helped.
    - Also, select one new idea or question about MRSA, antibiotic resistance, or evolution that you or your partner can share with the class. Mark them on your text with a star.

Whole class discussion

- Share how we clarified survival words and what they mean in this text.
- Help each other figure out the meanings of any remaining survival words.
- Which reading strategies helped in deciding which words are worth understanding?
- What additions or revisions can we make on the reading strategies list poster?
- Share new ideas about MRSA, antibiotic resistance and evolution.
- What ideas and questions can we add to the evidence interpretation posters for MRSA, antibiotic resistance and evolution?
- What new words can we add to our word wall?

MRSA Infection
Cause, Effect, Mechanism, and Explanation

Individual

What do you know, think, possibly remember, predict or wonder about the following terms?

cause	effect
mechanism	explanation

Pair discussion initial thoughts

- Take turns sharing your ideas for one minute each.
- Add partner's ideas to your own chart.
- **Stellar idea**: Select one idea that you or your partner can share with the class. Mark it with a star.

Whole class sharing

- Share your stellar idea.
- Listen closely to your classmates' ideas.
- Use science talk stems.
- Add peers' ideas to your chart

MRSA Infection
Finding Evidence

The most important goal of science is developing explanations (or models) of how natural phenomena work. For the MRSA investigation, you and your classmates do the work of forming explanations for how MRSA works. For now the focus is finding evidence that might relate to the inquiry question:

How does MRSA infect people?

Teacher model

- Make or locate: A MRSA Evidence and Interpretation notetaker
- Locate: "Superbug MRSA Worries Doctors, Athletes," "Kansas City Teen Gets MRSA from Attempted Lip Piercing, Almost Dies," and "How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?" in the MRSA Reader, pages R1-6.
- Listen and make notes below about the teacher's reading process.

Source	Evidence	Interpretation

Whole class discussion

- What did you notice about how your teacher identified evidence and formed interpretations?

Finding Evidence

Individuals

- Reread "Superbug MRSA Worries Doctors, Athletes."
- Identify evidence for **how MRSA infections occur**.
- Underline or highlight the evidence you find. Mark each **I** for infection.
- Make notes in your MRSA evidence and interpretation notetaker.

Pairs or small groups

- Take turns sharing the evidence you found and the interpretations you made.
- Add new evidence to your MRSA evidence and interpretation notetaker.
- **Stellar idea:** Select one piece of evidence and one interpretation that you or your partner can share with the class. Mark where it is in the texts with a star so you can find it and direct your peers to it.

Whole class

- Share stellar ideas (one piece of evidence and one interpretation).
    - Explain where it is in the text set.
    - Explain **how you and your partner knew it was evidence** about MRSA infection.
    - Explain the reading strategy you used to identify it.
- Listen and respond to your peers ideas. Use science talk stems.
- Add new evidence and interpretations to your MRSA evidence and interpretation notetaker.
- Which reading strategies helped identify and interpret evidence in the text?
- What additions or revisions can we make on the reading strategies list poster?

Repeat above steps for "Kansas City Teen Gets MRSA from Attempted Lip Piercing, Almost Dies," and "How long do microbes like bacteria and viruses live on surfaces in the home at normal room temperatures?"

MRSA Infection
Identifying the Components and Their Roles

To understand a phenomenon, scientists ask what are all the components (players) involved, what are the cause-and-effect relationships among them, and what are the mechanisms. To help themselves with the sense-making, scientist write their ideas using words, numbers, and visuals to represent the components, causes, effects, and mechanisms. For the MRSA investigation we'll use words and visuals to represent and communicate how MRSA infects people as we make sense of it.

Individual think-write

Locate: your MRSA evidence and interpretation notetaker and your cause-effect-mechanism-explanation chart on page 12. Review the evidence and interpretations you noted. Respond to the three prompts in the space below and, if needed, on the next page.

- What components or players need to be in the model? How do I know?
- What relationships between them need to be represented? How do I know?
- What kinds of visuals (pictures, figures, symbols, charts, diagrams, and SmartArt) might help?

Identifying the Components and Their Roles

Pair discussion

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.
- **Stellar idea:** Select one component or one relationship that you or your partner can share with the class. Mark it with a star. Be ready to explain how you identified it and how you might represent it with words or visuals.

Whole class discussion

- Share stellar ideas.
- Listen to your peers' ideas. Add peers' ideas onto your own response.
- Use science talk stems. Ask a question or respond to the ideas that your peers share.
- What additions or revisions can we make on the scientific model construction strategy list poster?

MRSA Infection
Piecing together the MRSA Infection Puzzle

A scientific model is an idea or set of ideas that explains a phenomenon: the components (players), the causes, the effects, the mechanisms. Piecing together the parts into a coherent scientific explanation (or model) takes creativity, deep thinking and perseverance. This is why people enjoy science – the joy of figuring stuff out. For now, our focus is on explaining:

How does MRSA infect people?

Teacher Model

- Locate: your MRSA Evidence and Interpretation notetaker, the scientific models criteria list poster and the scientific model construction strategy list poster.
- Listen and make notes below about the teacher's model construction process.

Whole class discussion

- What did you notice about your teacher's thought processes as he/she began to construct a model?
- What additions or revisions can we make on the scientific models criteria list poster and the scientific model construction strategy list poster?

Small groups

- Discuss
    - What does your model need to explain?
    - What scientific model construction strategy may help?
    - What criterion do you need to pay extra attention to?
- Review your MRSA evidence and interpretation notetaker and visuals.
- Create a scientific model that explains how MRSA infection occurs.
    - Use words and visuals to make your model as clear as possible.
    - Try to account for as much of the evidence from the texts as you can.
    - Check to make sure that your model makes sense with what you know about MRSA, bacteria, infection, and antibiotics.

Piecing Together the MRSA Infection Puzzle

These two blank pages are available for drafting your science model.

Piecing Together the MRSA Infection Puzzle

MRSA Infection
Peer Review and Consensus Building

Peer review and consensus building are essential to science knowledge building. Peer review provides assurance that someone who knows what they're doing has double-checked new claims and findings. In consensus building, ideas are examined from multiple perspectives. In peer review and consensus building we ask:

- Does the model help us explain the phenomenon?
- Does our model help us address our investigation/inquiry questions?
- Does the model (explanation) account for all of the available evidence?
- Can we use the model to predict what will happen if we manipulate the phenomena?
- Does the model agree with our understandings about how the world works and other science models?

Individual and small group model analysis

Prepare by analyzing your process and progress with your own model. Write your notes in **Box 1** on the peer review and consensus building notetaker, then discuss with your group. Use **Science Talk Stems** in your discussion.

- **Significance:** What ideas did you think about and what questions did you grapple with as you constructed your model? What was the puzzlement?
- **Purpose:** Why did you include what you did in your model? What does your model help to explain, predict, or describe?
- **Reliability and justification:**
  - What aspects of the phenomena or evidence does your model account for? What is your evidence and reasoning for your explanation?
  - What have not accounted for yet or what are you unsure about in your model?
- **Future research:** What questions do you have about the phenomena or explanatory model at this point in the investigation?

Peer Review and Consensus Building

Presenting and reviewing

Presenters: Provide your model to your peers and give them some time to read it over before you present. Some points to address in your presentations are:

- **Significance**: The big question for us was _____. What was hard to explain was _____.
- **Purpose**: We built our model to try to explain _____. We think it helps explain, predict or describe _____ because _____.
- **Reliability and justification**: We are very confident about _____ parts of our model because _____. We are still unsure about_____ parts of our model because _____.
- **Future research:** We still have questions about _____.

Reviewers: Listen, read and make notes in **Box 2** on the Peer Review and Consensus Building Notetaker about:

- What is clear and what is unclear.
- What is misrepresented, mistaken or missing (such as evidence that is unaccounted for).
- What does not belong in the model (things for which there are no evidence)?
- The questions you wonder about.
- Ideas for refinement.

Developing a response

Listeners take a few minutes to discuss their peers' model and develop a response

- What is well explained and accounted for in the model? Why?
- What is clear in the model? Why?
- What is unclear or misrepresented in the model? Why?
- What is missing from the model? Why?
- What does not belong in the model? Why?

Prepare 2-4 substantive responses to your peers' model. Write these in **Box 3** on the Peer Review and Consensus Building Notetaker. Use **Science Talk Stems** in your Feedback.

Sharing Feedback

- Groups take turn sharing and discussing their response to their peers' model.
- Each group makes notes of the feedback they receive from the peers in **Box 4** of the Peer Review and Consensus Building Notetaker.

MRSA Infection
Peer Review and Consensus Building Notetaker

Our Model

1. My notes for the presentation	4. My notes from peers' feedback

Peers' Model

2. My notes about peers' model	3. My response to peers' presentation

MRSA Infection
Reflection and Revision

Small group discussion

Discuss how you will respond to the feedback you received.

- What did you see or hear from other groups' models that you liked?
- How will you modify your model, based on the classroom discussion?

Use different colored sticky notes provided by your teacher to label parts of your models that you:

- Are very confident about and want to keep.
- Would like to add to your model.
- Still have questions about.

Now make the revisions (upgrades!) to your model.

Individual think-write

Respond to three of the following five prompts in the space below.

- What is one part of your MRSA infection model that you are proud of? Why?
- What are you learning about cause, effect, mechanism and explanation in science?
- What are you learning about science models and/or how to construct science models?
- What are you learning about bacteria, antibiotics and infection?
- What are you learning about MRSA, antibiotic resistance, and evolution?

Whole class discussion

- Share a response to either prompt.
- What additions or revisions can we make on the scientific models criteria list poster and the scientific model construction strategy list poster?
- What additions or revisions can we make on the evidence interpretation posters for MRSA, antibiotic resistance, and evolution?

Transmission and Spread of MRSA
Our Ideas About Contagious Diseases and Epidemics

Individual think-write

- What do you know, think, possibly remember, predict or wonder about the following terms?

contagious disease	epidemic
scope	scale

Pair discussion

- Take turns sharing your ideas for one minute each.
- Add partner's ideas to your brainstorm.
- **Stellar idea:** Select one idea that you or your partner can share with the class. Mark it with a star.

Whole class discussion

- Share the stellar idea you or your partner has about contagious diseases and/or epidemics.
- Listen closely. Add peers' ideas to your brainstorm.
- Use science talk stems. Respond to your peers' stellar ideas.

Transmission and Spread of MRSA
MRSA Scope and Scale

Individual think-write: preview

- Locate your science reading stems.
- Locate the next three texts (MRSA Reader pages R7-9).
    - "Antibiotic Resistance"
    - "Comparison of Estimated Death in U.S. in 2005"
    - "MRSA Skyrockets in Seattle"
- Take three minutes to look over the three texts and respond to the prompts below.
    - What might be challenging or interesting about reading these texts?
    - How are they alike and how are they different?
    - What kinds of texts are they? How do you know?
    - What predictions can you make about the kind of science information each may contain and how it might inform our investigation of MRSA?
    - What might you need to do to get as much as you can from reading these texts?

Pair discussion

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.
- Select one response that you or your partner can share with the class. Mark it with a star.

Whole class discussion

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

MRSA Scope and Scale

Reading and making thinking visible

- **Think Aloud:** Partners take turns thinking aloud with the text, "Antibiotic Resistance." One partner thinks aloud and the other partner makes notes in the margin about their partner's thoughts.

OR

- **Talk to the Text:** Individually talk to the text on "Antibiotic Resistance." Pairs take turns sharing their talk to the text comments.
- Use the science reading stems to help you share your reading process and work together to make sense of the text.

Pair discussion

After reading, discuss and respond to the prompts.

- **Reading process:** What science reading processes were important for your reading?
- **Inquiry:** What are you noticing or wondering now about MRSA, antibiotic resistance or evolution? What is interesting? What is important?
- **Stellar ideas**
    - Select a science reading process to share with the class. Mark it with a star.
    - Also, select one new idea or question about MRSA, antibiotic resistance, or evolution to share with the class. Mark them on your text with a star.

Whole class discussion

Share stellar ideas about reading process.

- What did you notice about your partner's (or your own) reading processes with this text?
- What reading challenges did you or your partner encounter and how did you respond to the reading challenge?
- What visuals or models did you or your partner form as you read? How did they help your understanding?
- What additions or revisions can we make on the reading strategies list poster?

Share stellar ideas about MRSA, antibiotic resistance, and evolution.

- What questions, connections, or ah-ha's do you have from your reading?
- What ideas and questions can we add to the evidence interpretation posters for MRSA, antibiotic resistance, and evolution?
- What new words can we add to our word wall?

Repeat above steps with the "Comparison of Estimated Death in U.S. in 2005" (R8) and "MRSA Skyrockets in Seattle" (R9).

Transmission and Spread of MRSA
Finding and Interpreting Evidence

Making sense of natural phenomena is messy work. You are always trying to make the best explanation you can with the information that is available. It can be hard to figure out what information helps explain what is going and harder still to figure out how it all ties together logically. For now, the focus is on finding and interpreting evidence that relates to these inquiry questions:

How widely has MRSA spread?
How is MRSA transmitted and spread?

Individual think-write

- Locate your MRSA evidence and interpretation notetaker. You may need additional pages now.
- Locate the MRSA Reader pages R1-9 (the first six texts).
- Review or re-read the texts and notetakers to identify evidence for **how MRSA is transmitted** and **how MRSA spread widely**.
- Underline or highlight the evidence you find. Mark each **T** for transmission or **S** for spread.
- Make notes in your evidence and interpretation notetaker.

Pairs or small group discussion

- Discuss how you know what counts as evidence about MRSA transmission and spread.
- Discuss how the evidence might link together – the cause and effect relationships.
- Add new evidence/interpretations to your MRSA evidence and interpretation notetaker.
- **Stellar Idea:** Select one evidence and one interpretation that you or your partner can share with the class. What reading process did you use to identify it? Mark where it is in the texts with a star so you can find it and direct your peers to it.

Whole class discussion

- Share stellar ideas (one piece of evidence and one interpretation).
    - Explain where it is in the text set.
    - Explain how you and your partner(s) knew it was evidence about MRSA transmission or spread.
    - Explain the reading strategy you used to identify it.
- Listen and respond to your peers ideas. Use science talk stems.
- Add new evidence/interpretations to your MRSA evidence and interpretation notetaker.
- What additions or revisions can we make on the reading strategies list poster?

Transmission and Spread of MRSA
Identifying the Components and Their Roles

Individual think-write

Locate your MRSA evidence and interpretation notetaker and your MRSA infection model. Review the evidence and interpretations you noted. Review your MRSA infection model. Use all of these to answer the prompts below:

- How do transmission and spread relate to MRSA infection?
- What parts of the MRSA infection model need to be a model for MRSA transmission and spread?
- What other components need to be in a model for MRSA transmission and spread? How do you know?
- What relationships between them need to be represented? How do you know?
- What kinds of visuals (pictures, figures, symbols, charts, diagrams, and SmartArt) might help?

Pair discussion

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.
- **Stellar idea:** Select one idea that you or your partner can share with the class. Mark it with a star.

Whole class discussion

- Share stellar ideas.
- Listen to your peers' ideas. Add peers' ideas onto your own response.
- Use science talk stems. Ask a question or respond to the ideas that your peers share.

Transmission and Spread of MRSA
MRSA Transmission and Spread Model

We have done the work of identifying the infection's components and their roles. Now we're ready to tie this information together to form a scientific model that answers the questions:

How widely has MRSA spread?
How is MRSA transmitted and spread?

Small group discussion

- Locate your MRSA evidence and interpretation notetaker, scientific model criteria list, and scientific model construction strategy list.
- Discuss with your group:
    - What does your model need to explain?
    - What scientific model construction strategy may help?
    - What criterion do you need to pay extra attention to?
- Review your MRSA evidence and interpretation notetaker and visuals for transmission and spread.
- Work with your group to create a scientific model that explains how MRSA transmission and spread occur.
    - Use words and visuals to make your model as clear as possible.
    - Try to account for as much of the evidence from the texts as you can.
    - Try to make your model consistent with other ideas we have about how MRSA works. Show how MRSA infection fits into this new MRSA model.
- The next two blank pages are available for drafting your science model.

MRSA Transmission and Spread Model

MRSA Transmission and Spread Model

Transmission and Spread of MRSA
Peer Review and Consensus Building

Use the peer review and consensus building protocol on pages 20-21 and the notetaker below.

Our Model

1. My notes for the presentation	4. My notes from peers' feedback

Peers' Model

2. My notes about peers' model	3. My response to peers' presentation

Transmission and Spread of MRSA
Reflection and Revision

Small group discussion

Discuss how you will respond to the feedback you received.

- What did you see or hear from other groups' models that you liked?
- How will you modify your model, based on the classroom discussion?

Use different colored sticky notes provided by your teacher to label parts of your models that you:

- Are very confident about and want to keep.
- Would like to add to your model.
- Still have questions about.

Revise: Make the revisions (upgrades!) to your model.

Individual think-write

Respond to three of the following five prompts.

- What is one part of your MRSA infection model that you are proud of? Why?
- What are you learning about cause, effect, mechanism, and explanation in science?
- What are you learning about science models and/or constructing science models?
- What are you learning about bacteria, antibiotics, and infection?
- What are you learning about MRSA, antibiotic resistance, and evolution?

Whole class discussion

- Share a response to either prompt.
- What additions or revisions can we make on the scientific models criteria list poster and the scientific model construction strategy list poster?
- What additions or revisions can we make on the evidence interpretation posters for MRSA, antibiotic resistance, and evolution?

Evolution of SA to MRSA

Our first ideas about the origin of MRSA

Individual think-write

Respond to the following prompts.

- What do you know, think, possibly remember, guess or wonder about what caused Staphylococcus aureus (SA) become methicillin-resistant Staphylococcus aureus (MRSA)?
- Why might it be important to know how SA became MRSA?

Pair discussion

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.
- **Stellar idea:** Select one idea that you or your partner can share with the class. Mark it with a star.

Whole class discussion

- Share stellar ideas.
- Listen closely. Add great ideas from your peers to your own response.
- Use science talk stems. Respond to your peers' stellar ideas.

Evolution of SA to MRSA
Change over Time

Science reading is inquiry. When we read science text, we form and revise models that explain the phenomena we are reading about. When we read about a new science topic, it may feel like a muddle. There are many new ideas. We have many questions. The ideas are not organized in our minds. Then we dig in. We muster our prior knowledge. We try to make connections and answer our questions. We read more, think more, write more and talk more to create a model out of the muddle. The focus of this reading inquiry is to uncover more reading processes that helps us move from the muddle to the model and to figure out how these processes work for us.

Individual think-write: preview

- Locate: your science reading stems.
- Locate the next five texts (MRSA Reader pages R10-17).
    - "MRSA History"
    - "Superbug, Super-fast Evolution"
    - "Resistance to the antibiotic Vancomycin"
    - "Battling Bacterial Evolution: the Work of Carl Bergstrom"
    - "Modification by Natural Selection"
- Take four minutes to look over the five texts.
    - What might be challenging or interesting about reading these texts?
    - How are they alike and how are they different?
    - What kinds of texts are they? How do you know?
    - What predictions can you make about the kind of science information each may contain and how it might inform our investigation of MRSA?
    - What might you need to do to get as much as possible from reading these texts?

Pair discussion

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

Whole class discussion

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

Change over Time

Teacher model

- Locate "MRSA History" in your Reader.
- Listen and make notes about the teacher's reading process.

Whole class discussion

- What did you notice about how your teacher read the science text?
- What are some science reading processes that you noticed?
- What additions or revisions can we make on the reading strategies list poster?

Change over Time

Reading and making thinking visible

- **Think Aloud:** Partners take turns thinking aloud with the text, "MRSA History." One partner thinks aloud and the other partner makes notes in the margin about their partner's thoughts.
  OR
- **Talk to the Text:** Individually talk to the text on "MRSA History." Pairs take turns sharing their talk to the text comments.
- Use the science reading stems to help you share your reading process and work together to make sense of the text.

Pair discussion

After reading discuss and respond to the prompts.

- **Reading process:** What science reading processes were important for your reading?
- **Inquiry:** What are you noticing or wondering now about MRSA, antibiotic resistance or evolution? What is interesting? What is important?
- **Stellar ideas**
  - Select science reading process to share with the class. Mark it with a star.
  - Also, select one new idea or question about MRSA, antibiotic resistance, or evolution to share with the class. Mark them on your text with a star.

Whole class discussion

Share stellar ideas about reading process.

- 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? For texts with visuals: How did you read the visual(s)? What modeling did you do as you read?
- What additions or revisions can we make on the reading strategies list poster?

Share stellar ideas about MRSA, antibiotic resistance, and evolution.

- What questions, connections, or ah-ha's do you have from your reading?
- What ideas and questions can we add to the evidence interpretation posters for MRSA, antibiotic resistance, and evolution?
- Add new words to our word wall.

Repeat above steps with the next four texts: "Superbug, Super-fast Evolution" (R12-13), "Resistance to the antibiotic Vancomycin" (R14), "Battling Bacterial Evolution: The Work of Carl Bergstrom" (R15-16), and "Modification by Natural Selection" (R17).

Evolution of SA to MRSA
Identifying and Connecting Evidence for How SA became MRSA

Whole class

- Locate your MRSA evidence and interpretation notetaker. You may need additional pages now.
- Form groups of four and count of by ones and twos in each group.

Individual think-write

- **Ones**: Review or re-read each odd numbered text and the notetaker to identify evidence for how SA became MRSA.
- **Twos**: Review or re-read each even numbered text and the notetaker to identify evidence for how SA became MRSA.
- Underline or highlight the evidence you find. Mark each **E** for evolution.
- Make notes in your evidence and interpretation notetaker.

Small group discussion

- Share the evidence you found for how SA became MRSA.
- Discuss why each counts as evidence for how SA became MRSA.
- Discuss how the evidence might link together. What are the cause and effect relationships?
- Add new evidence and interpretations to your MRSA evidence and interpretation notetaker.
- **Stellar idea:** Select one evidence and one interpretation that you or your partner can share with the class. What reading process did you use to find and identify it? Mark where it is in the texts with a star so you can find it and direct your peers to it.

Whole class discussion

- Share stellar ideas (one piece of evidence and one interpretation).
    - Explain where it is in the text set.
    - Explain how you and your partner(s) knew it was evidence about how SA became MRSA.
    - Explain the reading strategy you used to find and identify it.
- Listen and respond to your peers ideas. Use science talk stems.
- Add new evidence/interpretations to your MRSA evidence and interpretation notetaker.
- What additions or revisions can we make on the reading strategies list poster?

Evolution of SA to MRSA
Scientific Model of How SA Became MRSA

Small group discussion

Locate and review: MRSA evidence and interpretation notetaker, models for MRSA infection, transmission and spread, the scientific model criteria list, and the scientific model construction strategy list.

- Discuss with your group:
    - What does your model need to explain?
    - How can the model for how SA became MRSA build off of the models for MRSA infection, transmission, and spread?
    - What scientific model construction strategy may help?
    - What criterion do you need to pay extra attention to?
    - What components and relationships belong in the model? What words and visuals could depict them?
- Work with your group to create a scientific model that explains how SA became MRSA.
    - Use words and visuals to make your model as clear as possible.
    - Try to account for as much of the evidence from the texts as you can.
    - Try to make your model consistent with other ideas we have about how MRSA works. Show how MRSA infection, transmission and spread fit into this new MRSA model.
- The next two blank pages are available for drafting your science model.

Scientific Model of How SA Became MRSA

Scientific Model of How SA Became MRSA

Evolution of SA to MRSA
Peer Review and Consensus Building

Use the peer review and consensus building protocol on pages 20-21 and the notetaker below.

Our Model

1. My notes for the presentation	4. My notes from peers' feedback

Peers' Model

2. My notes about peers' model	3. My response to peers' presentation

Evolution of SA to MRSA
Reflection and Revision

Small group discussion

Discuss how you will respond to the feedback you received.

- What did you see or hear from other groups' models that you liked?
- How will you modify your model, based on the classroom discussion?

Use different colored sticky notes provided by your teacher to label parts of your models that you:

- Are very confident about and want to keep.
- Would like to add to your model.
- Still have questions about.

Revise: Make the revisions (upgrades!) to your model.

Individual think-write

Respond to three of the following five prompts.

- What is one part of your MRSA infection model that you are proud of? Why?
- What are you learning about cause, effect, mechanism, and explanation in science?
- What are you learning about science models and/or constructing science models?
- What are you learning about bacteria, antibiotics and infection?
- What are you learning about MRSA, antibiotic resistance, and evolution?

Whole class discussion

- Share a response to either prompt.
- What additions or revisions can we make on the scientific models criteria list poster and the scientific model construction strategy list poster?
- What additions or revisions can we make on the evidence interpretation posters for MRSA, antibiotic resistance, and evolution?

Managing the Public Health Challenge of MRSA
Scientific Models and Solutions

Natural phenomena offer both opportunities and challenges. Scientists draw on scientific models to design solutions to these challenges.

Individual think-write

Respond to either of the following two prompts.

- Describe a real-world challenge presented by natural phenomena. What are some solutions scientists have designed (or are trying to design) to address these challenges? What scientific models or explanations might scientist have drawn on to design these solutions?
- What are some real-world challenges presented by MRSA infection, transmission, spread and evolution? What is (might be) the impact of MRSA on you and your community? How significant are the challenges MRSA presents? Why?

Pair discussion

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

Whole class discussion

- Share your response or your partner's response.
- Listen and respond to your peers' ideas. Use science talk stems.
- Add peers' ideas onto your own response.

Managing the Public Health Challenge of MRSA
Solutions for MRSA Infection, Transmission, Spread, and Evolution

Individual think-write: preview

- Locate your science reading stems
- Locate the next two texts(MRSA Reader pages R18-21)
    - "Wash your Hands"
    - "The Success of Evolutionary Engineering"
- Take three minutes to look over the texts, considering these questions:
    - What might be challenging or interesting about reading these texts?
    - What kinds of texts are they? How do you know?
    - What do you predict about the reliability of the information in these texts? How do you know?
    - What predictions can you make about the kind of science information each may contain and how it might inform our investigation of MRSA?

Pair discussion

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

Whole class discussion

- Share your response or your partner's response.
- Listen and respond to your peers' ideas. Use science talk stems.
- Add peers' ideas onto your own response.

Solutions for MRSA Infection, Transmission, Spread, and Evolution

Teacher model

- Locate: "Wash your Hands."
- Listen and make notes about the teacher's reading process.

Whole class discussion

- What did you notice about how your teacher read the science text?
- What are some science reading processes that you noticed?
- What additions or revisions can we make on the reading strategies list poster?

Solutions for MRSA Infection, Transmission, Spread, and Evolution

Reading and making thinking visible

- **Think Aloud:** Partners take turns thinking aloud with the text, "Wash your Hands." One partner thinks aloud and the other partner makes notes in the margin about their partner's thoughts.

OR

- **Talk to the Text:** Individually talk to the text on "Wash your Hands." Pairs take turns sharing their talk to the text comments.
- Use the science reading stems to help you share your reading process. Work together to make sense of the text and predict potential solutions for MRSA infection, transmission, spread, and evolution.

Pair discussion

After reading, discuss and respond to the prompts.

- **Reading Process:** What science reading processes were important for your reading?
- **Inquiry:** What are you noticing or wondering now about MRSA, antibiotic resistance, or evolution? What is interesting? What is important?
- **Stellar ideas**
    - Select a science reading process to share with the class. Mark it with a star.
    - Also, select one potential solution for MRSA infection, transmission, spread, and evolution. Mark them on your text with a star.

Whole class discussion

Share stellar ideas about reading process

- 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 modeling did you do as you read?
- What additions or revisions can we make on the reading strategies list poster?

Share stellar ideas about MRSA, antibiotic resistance, and evolution.

- What questions, connections, or ah-ha's do you have from your reading?
- What ideas and questions can we add to the evidence interpretation posters for MRSA, antibiotic resistance, and evolution?
- Add new words to our word wall.

Repeat above steps with "The Success of Evolutionary Engineering."

Managing the Public Health Challenge of MRSA
Think Scientifically, Act Locally

You have read about MRSA. You have talked about MRSA. You have made models of MRSA infection, transmission, spread, and evolution. You've identified the challenges MRSA presents. Now it is time to apply that knowledge to predict a course of action to limit the impact of MRSA.

Teacher model and individual think-write

- Locate: MRSA evidence and interpretation posters, MRSA evidence and interpretation notetakers, and MRSA models for infection, transmission and spread, and evolution.
- Review your MRSA posters, notetakers, and models to identify **problems** in your community related to:
    - MRSA infection
    - MRSA transmission and spread
    - MRSA evolution (the evolution of antibiotic resistance in MRSA)
- What is the problem and how is it related to MRSA?

Small group discussion

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

Whole class discussion

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

Think Scientifically, Act Locally

Teacher model and individual think-write

- Locate: MRSA evidence and interpretation posters, MRSA evidence and interpretation notetakers, and MRSA models for infection, transmission and spread, and evolution.
- Select two of the problems in your community related to MRSA.
- Review your MRSA posters, notetakers and models to identify possible points in the models for intervention or possible solutions.
- What course of action could limit (possibly limit) the impact of:
    - MRSA infection
    - MRSA transmission and spread
    - MRSA evolution (the evolution of antibiotic resistance in MRSA)
- Who (in your community) would have to act to make a difference?

Small group discussion

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.
- Prepare to share about one problem and course of action.

Whole class discussion

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

Think Scientifically, Act Locally

Small group discussion

- Select one problem in your community related to MRSA and at least one course of action or solution for the problem for your group.

Teacher model and small group work

- Write a compelling scientific **recommendation** for the course of action your team determined.
    - Decide who will be the audience for the recommendation.
    - Describe the course of action.
    - Explain how and why the course of action could limit the impact of **MRSA infections, transmission and spread**, AND **evolution**. Ground your explanation in your scientific models for MRSA infections, transmission and spread, and evolution.
    - Make sure that the recommendation gets to the root of the problem.
    - Reflect on your own learning (think about what was hard for you to understand, or what was most important to your understanding) to help you decide what information the audience needs to know to understand the recommendation.
    - Address any misconceptions that might interfere with the audience's understanding.

Our Scientific Recommendation (Drafts)

Think Scientifically Act Locally

Managing the Public Health Challenge of MRSA
MRSA Recommendation Science Seminar

Small group analysis or own recommendation

Prepare for the science seminar by analyzing your process and progress with your group's recommendation. Use **science talk stems** in your discussion. Make notes in science seminar notetaker.

- **Purpose:** What problem does your course of action address? Why did you include what you did in your recommendation?
- **Significance**: What would be the potential impact if your recommendation is carried out? How does it get at the root of the problem?
- **Reliability and justification:**
  - What aspects of the phenomena or evidence does your course of action take into account?
  - What have not accounted for yet, or what are you unsure about in your course of action?
- **Future research:** What questions do you have about the phenomena or explanatory model that relate to your recommended course of action?

Presenting and reviewing

Presenters: Provide your model to your peers and give them some time to read it over before you present. Some points to address in your presentations are:

- **Purpose**: Our course of action is designed to deal with _____.
- **Significance**: We think that it will _____ because _____.
- **Reliability and justification**: We are very confident about _____ parts of our course of action because _____. We are still unsure about _____ parts of our course of action because _____.
- **Future research:** We still have questions about _____.

Reviewers: Listen, read and make notes on the science seminar notetaker about:

- What is clear and what is unclear.
- What is misrepresented, mistaken or missing (such as evidence that is unaccounted for).
- What does not belong in the course of action.
- The questions you wonder about.
- Ideas for refinement.

MRSA Recommendation Science Seminar

Developing a response

Listeners take a few minutes to discuss their peers' recommendations and develop a response.

- What problem is the course of action intended to solve?
- Is the course of action intended to likely to solve it? Why or why not?
- Does the course of action get to the root of the problem?
- What is well explained and accounted for in the recommendation? Why?
- What is clear in the recommendation? Why?
- What is unclear or misrepresented in the recommendation? Why?
- What is missing from the recommendation? Why?
- What does not belong in the recommendation? Why?

Prepare 2-4 substantive responses to your peers' model. Write these in the science seminar notetaker. Use **science talk stems** in your feedback.

Sharing feedback

Groups take turn sharing and discussing their response to their peers' model.
Each group makes notes of the feedback they receive on the science seminar notetaker.

Managing the Public Health Challenge of MRSA
Science Seminar Notetaker

My Group's MRSA Recommendation

My notes for the presentation	My notes from peers' feedback

Peers' MRSA Recommendations

My notes about peers' model	My response to peers' presentation

My notes about peers' model	My response to peers' presentation

Science Seminar Notetaker

Peers' MRSA Recommendations

My notes about peers' model	My response to peers' presentation

My notes about peers' model	My response to peers' presentation

My notes about peers' model	My response to peers' presentation

You may need to make additional pages.

Managing the Public Health Challenge of MRSA
Building Consensus

Individual

- Which courses of action might be the most effective at addressing the MRSA epidemic? Which gets at the root of the problem? Why do you think so?

Whole class discussion

- Which courses of action might be the most effective at addressing the MRSA epidemic? Which gets at the root of the problem? Why do you think so?

Managing the Public Health Challenge of MRSA
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?

Small group discussion

- Take turns sharing your ideas for one minute each.

Whole class discussion

- Share your response.