PROJECT READi

Name _____ Date _____

Teacher _____

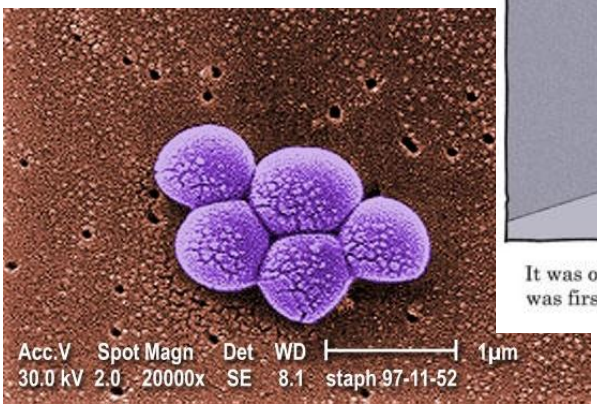
MRSA

Investigation, Part II

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.

inquirium

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WestEd

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 R11-18).
    - "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 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 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" (R13-14), "Resistance to the antibiotic Vancomycin" (R15), "Battling Bacterial Evolution: The Work of Carl Bergstrom" (R16-17), and "Modification by Natural Selection" (R18).

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 R19-22)
    - "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.

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 of 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 been 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 recommendation 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 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' recommendations. 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' recommendations. 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' recommendation	My response to peers' presentation

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

Science Seminar Notetaker

Peers' MRSA Recommendations

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

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

My notes about peers' recommendation	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.

Source	Evidence	Interpretation

Source	Evidence	Interpretation

Source	Evidence	Interpretation

Source	Evidence	Interpretation

Source	Evidence	Interpretation

Source	Evidence	Interpretation

Source	Evidence	Interpretation

Source	Evidence	Interpretation

