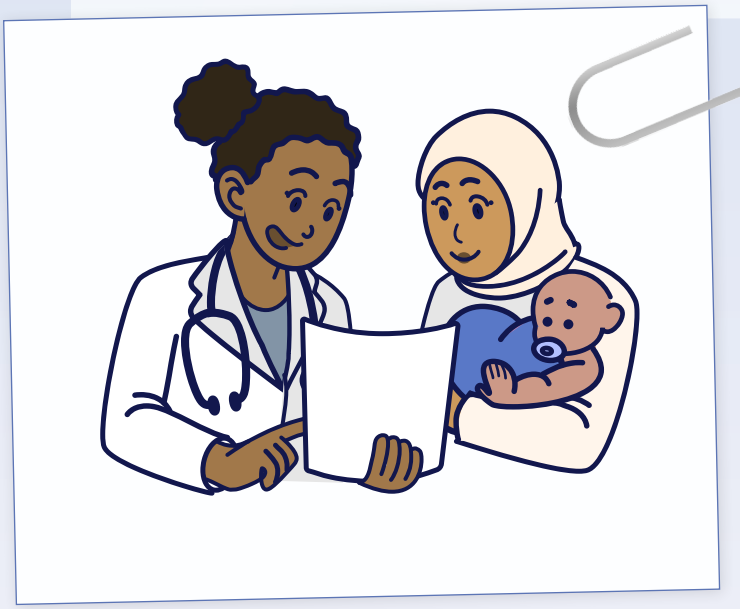
VAXFAX

AEM Biovisuals



A Allison Abel
E Elise Butler
M Melody Zhang

AEM Biovisuals

Meet AEM!

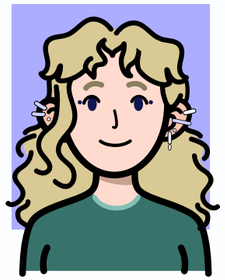


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Table of Contents

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Problem

Measles, one of the most contagious infectious diseases, is on the rise in the United States. With over 1,000 reported cases as of June, 2025 is projected to have the highest rate of infection since measles was declared "eliminated" in the US in 2000.[1]

Vaccine Hesitancy

Lapses in MMR vaccination, partially attributable to **parental vaccine hesitancy,** are a major driver of increasing measles cases in the US.[1,2] Many individuals turn to primary care providers for guidance regarding vaccine recommendations. Trusted, empathetic providers play a role in changing the perceptions of individuals who previously refused vaccinations.[3,4] Though pediatricians are on the frontline in combating vaccine hesitancy, these conversations can be emotionally fraught and difficult in a busy clinic.

Resources with evidence-based techniques for these conversations are text-based with limited or no visuals and are typically chapters or webpages that are not all suitable for quick reference. These sources typically lack direct access to visual and teaching tools to share with parents.

Measles Response

As a result of historical immunization practices, **many pediatricians in the United States have never encountered measles.**[1] It can present similarly to other viral infections, and correct triage and response are necessary to avoid exposing other patients and healthcare workers.[5] Outbreaks evolve rapidly and reporting guidelines vary by jurisdiction, making up-to-date, location specific information and easy access to the literature a necessity.[6,7]

Few applications address measles recognition and response alongside communication strategies to increase vaccine uptake, and those that do are broad websites or book chapters rather than interactive platforms focused on this issue. As measles cases continue to rise, **pediatricians need easy access to applicable, timely information and an understanding of effective communication strategies to prevent future infections.**

Solution

We propose **VaxFax**, a website with quick-reference features and learning resources to support pediatricians in addressing vaccine-preventable diseases. This site will work in tandem with trusted sources, linking to the literature and providing evidence-based, unbiased information, distilled into easily digestible multimedia.

The website will offer two main resources for pediatricians, both accessible through the homepage. The first will be a library of vaccines and vaccine-preventable diseases. Pediatricians may select a disease or vaccine to access timely updates and recommendations per state. This will include vaccination guidelines, updates on local outbreaks and case trends, and tools to help providers recognize each disease and respond with the appropriate precautions. Pediatricians may also use these pages as a quick reference for vaccine recommendations, triage, care, and diagnostic criteria, and to access multimedia resources to share with parents.

The second resource will be a "**Conversation Handbook**" to help providers understand and address parental vaccine hesitancy. The handbook will work with an embedded conversation simulator to allow pediatricians to practice evidence-based conversational skills with archetypes of vaccine-hesitant parents. Pediatricians may also access visual aids, educational videos, and visual-based information sheets in multiple languages, which they can share with patients and their families as an efficient educational tool.

VaxFax aims to empower pediatricians to confidently navigate vaccine-related conversations and stay informed about evolving vaccination guidelines in their communities. Quick reference and rapid learning are critical for busy providers; VaxFax acts as a rapid, reliable source of information which pediatricians can turn to for information at a moment's notice or to refresh their conversational skills.

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Market Research

Pediatricians often rely on established sources such as the Centers for Disease Control and Prevention (CDC) and the American Academy of Pediatrics (AAP) websites for guidance about infectious diseases and patient care. VaxFax will work in tandem with these resources to provide trusted information in an accessible and engaging multimedia format.

CDC Resources

The CDC website offers comprehensive information about vaccine-preventable diseases intended for a broad audience. CDC resources are often text-heavy and dense, and as a result may be less user-friendly in a busy clinical setting. The CDC pages for providers are reputable and well-organized, but they lack audiovisual teaching tools and the site has such a broad scope that users must search for content relevant to their needs.

The CDC's "Be Ready for Measles" toolkit includes downloadable materials such as fact sheets, checklists, flowcharts, videos and slide presentations for providers to reference and to distribute to the public. The content is useful, timely, and appropriate for its intended audience, but the page lacks a search or filter feature, and some of the resources must be downloaded before they can be previewed. The content for mixed audiences and inefficient searching may decrease this page's value for users. The resources intended for healthcare providers have limited visual components.

AAP Resources

The AAP Red Book is a trusted reference for pediatricians and includes a recent chapter outlining evidence-based strategies for communicating about vaccinations, presented in a clear and well-organized format. The Red Book Online provides quick links to immunization schedules and information about outbreaks. While an excellent and trusted resource, the Red Book is text-based and has few visual aids, and its content is not limited to vaccine-preventable diseases. It is available for purchase or subscription, and while individual sections can be downloaded for free, entire chapters cannot be downloaded at once.

The AAP website hosts a Measles Toolkit and an Immunization Toolkit with resources for providers to show parents. The content is informative and appropriate for its audience, but the provided social media graphics are text-only, and sequential images must be downloaded individually. Most of the videos in the immunization toolkit are housed in a playlist with no filter feature, and most consist of a professional speaking to the viewer rather than animations. The videos that are animated and/or linked directly from the toolkit have higher viewership than the others by far, which may indicate they are more discoverable and/or engaging.

The AAP's Patient Care page links to measles resources for providers, which are thorough, discoverable and succinct. While wonderful for busy clinicians, these resources are text-only. PatientCare also provides conversation guides for immunization conversations, but these are collections of talking points, fact sheets and infographics, rather than resources containing evidence-based conversation guidelines.

PIDS CVEP

The Comprehensive Vaccine Education Program (CVEP), developed by the Pediatric Infectious Disease Society, is a free online platform offering a variety of learning modules for healthcare providers. While these modules provide helpful provider education about a variety of topics, the platform is not intended for quick reference.

Design and Interface Inspiration

The websites below are not direct competitors to VaxFax™ and have been referred to for inspiration and to inform the design of VaxFax™.

Medscape is an app for healthcare professionals that is laid out in a clean professional format, with icons and quick links to help providers access the information they need quickly. **Drugs.com** is a reference website providing information about different pharmaceuticals. It includes many search options and tabs of information to display the variety of pharmaceuticals to explore in an organized, succinct manner.

Objectives

Global

After extended interaction with VaxFax, providers will be able to **identify and address vaccine preventable infectious diseases** and **communicate with parents** about disease transmission and vaccine efficacy.

Enabling

After interacting with VaxFax, providers will be able to:

- **Describe** measles vaccine specific recommendations for their area
- **Assess** their understanding of, and keep up to date with, local measles cases and recommendations
- **Apply** evidence-based conversation strategies when speaking to vaccine-hesitant parents
- **Provide** parents with resources about disease transmission and vaccines

User Journey Map

We developed a journey map to help us empathize with our user persona throughout the process of using our application, helping us to identify potential needs, opportunities, features and pain points.

	Awareness	Exploration	Decisions	Advocacy
Actions	Advertisement Partnerships with hospital, Red Book/AAP/ CDC Word of mouth	Users interact with website via organized and easy to navigate pages, including interactives, animations, and other visuals	Confidence discussing vaccine hesitancy Confidence discussing measles with peers and patients Confidence recognizing and addressing measles in the clinic	Recommending to other health professionals Informing people in community about measles
Touchpoints	Social media, communications from hospital	App/website interface	Phone, computer	Word of mouth Social media
Experience/ Emotions	Interest	Curiosity, Confidence, Excitement	Relief, Confidence	Satisfaction
Pain Points	Internet connection	Must learn how to navigate website Information must be easy to find	Lots of information	N/A
Opportunities	Advertising and outreach, partnership with hospitals, resources	Engaging visuals, clear hierarchy of information Easy to read categories/tabs with information Easy to navigate interactives and simulations	Clearer communication with patients Links to more in-depth sources Concise and clear information for efficient decision-making	Easy to recommend to a wide variety of people

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Learning Theories

The design and information delivery of VaxFax are informed by three foundational learning theories, which serve as the framework for the entire platform.

Cognitive Theory of Multimedia Learning (CTML)

This theory suggests that people learn through two main channels of information: verbal and visual. There are limits to the amount of processing in each channel, and it is best to eliminate additional or extraneous information. Throughout our application, we will apply this theory by providing imagery, videos, and text as sources of information which access both the verbal and the visual channel. Both the webpages and the conversation simulator will contain strong visual cues to guide the viewer as well as graphics which accompany text to promote learning efficiency. We will also use a strong visual hierarchy, allowing users to grasp the most important information first. In line with CTML, we will also provide audiovisual and visual/text resources for pediatricians to share with parents.

Minimalist Theory

This theory posits that information should reach the user as soon as possible and all learning tasks should be clearly defined. For our project, conversation suggestions for vaccine hesitant parents will be delivered in a decisive, clear way. The website will be easy to navigate, balancing a minimal number of clicks to reach each webpage with limited options on each page. A minimalist teaching approach will increase ease of use for busy clinicians, who require efficient resources.

Cognitive Flexibility Theory

This learning theory stresses knowledge acquisition through multiple modalities and perspectives, allowing learners to apply the knowledge in variable or complex situations.8 In our application, physicians may learn conversation strategies through text, videos, imagery, and in practice via a simulation, all through the same website. Within the simulation, a variety of scenarios will be presented, reinforcing evidence-based strategies and allowing learners to practice them under varying conditions. Users will be able to freely explore the website, which provides links between relevant parts of individual sections as well as external sources, allowing them to construct and reinforce a broad understanding of how concepts interact. An example of this would be a pediatrician learning the circumstances leading to the generation of a misconception about vaccines, the types of misconceptions, information which disputes the misconception, and finally, ways to present that information to a parent.

User Profile and Persona

VaxFax is designed primarily for pediatricians who want to be prepared for disease outbreaks in their area and equipped to communicate about vaccines with parents.

Name:

Dr. Isaac Williams

Role:

Pediatrician

Persona Statement:

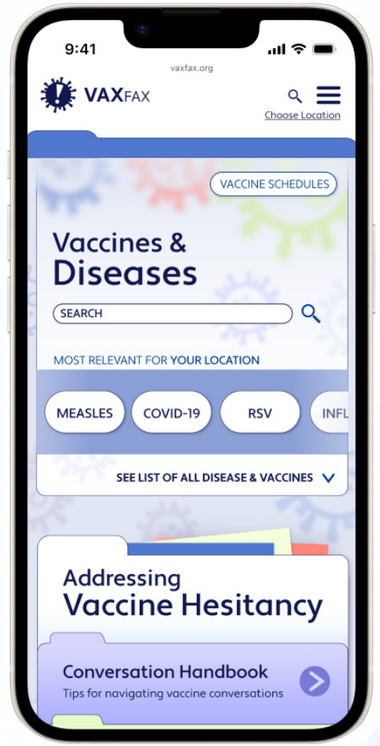
Dr. Isaac Williams, 47, is a pediatrician who is aware of a measles outbreak in the area and wants to make sure his clinic is prepared. He and his team have never seen a measles case, and many of his staff are uncertain about recognizing cases and responding appropriately, especially since the situation is developing quickly.

They have experienced an increased number of parents calling, concerned about measles. Dr. Williams also deals with many vaccine hesitant parents. He wants to make sure the clinic is prepared to address changing recommendations, and that they can recognize cases and follow appropriate, up-to-date protocols. It is also important to him that he and his staff can have candid, productive conversations with parents about vaccination and measles safety.

Design Specifications

Hardware

VaxFax will feature an intuitive and engaging web interface for mobile and desktop devices. This prototype is tailored for the mobile version.



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Design Specifications
Logos and Icons

AEM Biovisuals

VAXFAX

Measles icon

Design Specifications
Style Sheet

Colors:

#10184F

#F5867A

#D7EDB4

#5178CE

#ADADFF

Fonts:

Apertura Regular

Apertura Medium

Apertura Bold

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User Testing

A user test was conducted using low-fidelity wireframes to gather feedback and insights that would inform the high-fidelity design phase and help identify issues with the current website's design and user flow. Four users were tested via a mixture of in-person user testing under direct observation and monitored remote testing over Zoom. Participants were asked to roleplay as pediatricians as they navigated through the site and were instructed to give insights, opinions, and observations about the website prototype as they completed each task.

Users

- 49 yr old, female, high school teacher (in-person)
- 24 yr old, male, engineer (in-person)
- 48 yr old, male, physician/surgeon and father (monitored remote)
- 48 yr old, female, mother and former nurse (monitored remote)

User Testing

Prompts

1. What do you think this website's purpose is?
2. Who is the intended audience?
3. What do you think the conversation handbook is for?
4. If you wanted some fast facts about measles, what might you click?
5. If you wanted to learn more about Measles specific Transmission rates/ triage/vaccination guidelines, where would you go?
6. Can you navigate back to the home page?
7. If you wanted to find detailed recommendations for the MMR vaccine, where would you go?
8. How would you find handouts to give to parents interested in learning more about a particular vaccine or disease?
9. If you wanted to learn about conversation tips for discussing vaccine hesitancy, where might you click?
10. You would like to practice having a conversation with a vaccine-hesitant parent, where might you go?
11. If you wanted a quick way to see where measles cases are in the US, where would you go?

User Testing

Insights

Our users generally understood the purpose and audience of the platform and found it to be a useful resource. They understood the phrasing of section titles like “conversation handbook.” The users liked the availability of handouts and visual aids and were able to complete the tasks quickly in the majority of cases.

Some pain points we identified through user testing included:

- Difficulty finding conversation tips. These were moved to be more discoverable.
- Difficulty navigating the site quickly, especially as a busy provider. We simplified the pages and paired section links with icons and colors to make them faster to find.
- Some users had difficulty searching for vaccine-preventable diseases. We made these more visible on the home page.
- When tasked with finding information from the bottom of the “measles” page, users always chose the timely update links with icons (at the top of the page), thinking they would lead to the same information. We reworked the page so these icons did lead to in-depth information, and location-based updates would come up automatically when a location was selected.

Our users also suggested that we make the patient handouts and conversation simulator more quickly accessible. Some features they suggested were links to the literature whenever relevant, separating travel vaccines from routine vaccines, and making QR codes and language selection options abundant in the toolkit (which we elected not to build out as a storyboard).

Accessibility

VaxFax is designed to be accessible and easy to use, with separate content catered to both experts and a lay audience.

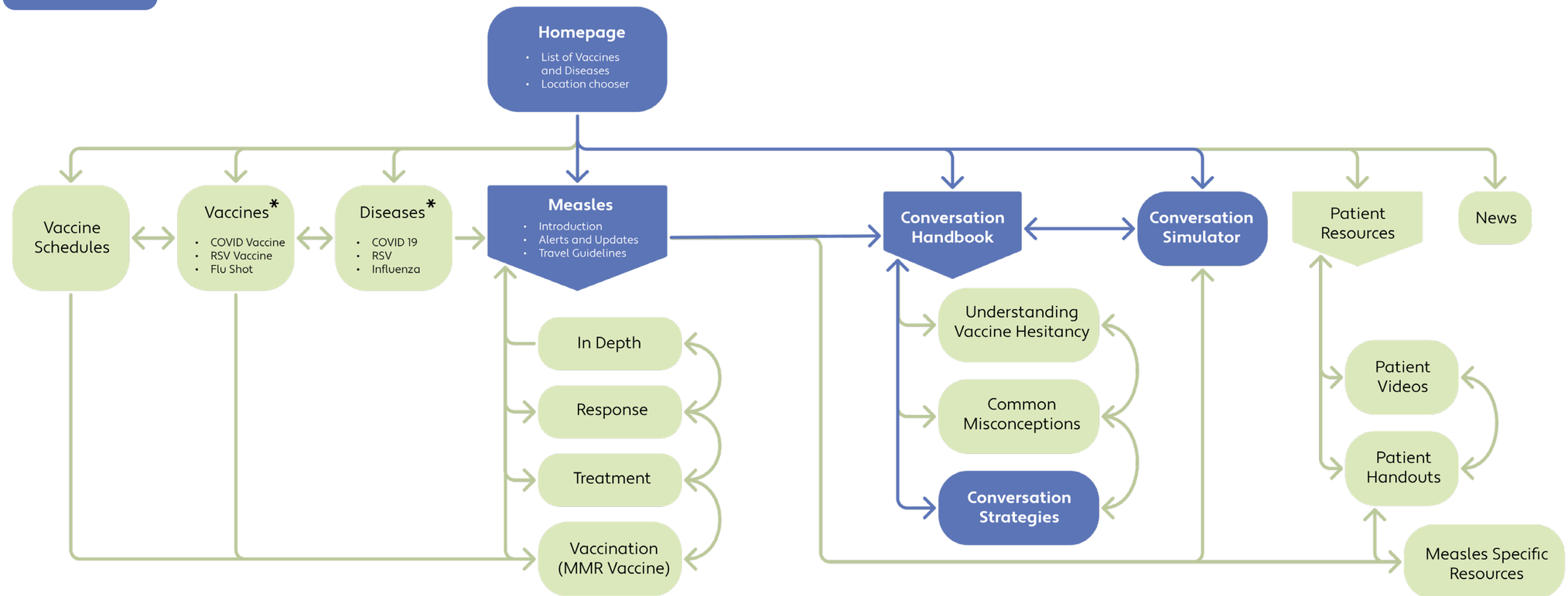
Text on all pages has a contrast ratio of at least 4:5:1 (WCAG AA standards), and body text has a contrast ratio of 7:1 (WCAG AAA standards). Fonts are optimized for readability, with sans serif fonts and high contrast colors used throughout. The high-contrast palette is color-blindness friendly, maintaining usability for those with protanopia or deuteranopia.

Text descriptions and closed captioning will be provided for videos. Parent-focused videos accessible through the site will be hosted on a secondary platform, such as YouTube, for parents to access through links or QR codes provided by their pediatricians or shared on social media.

Patient materials are available in multiple languages and are written at an appropriate reading level.

Flowchart

Proposal Storyboards



* Additional Diseases/Vaccine pages to be developed

Link to other resources (links to Redbook and AAP will be available on the bottom of every page)

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Storyboards
Homepage

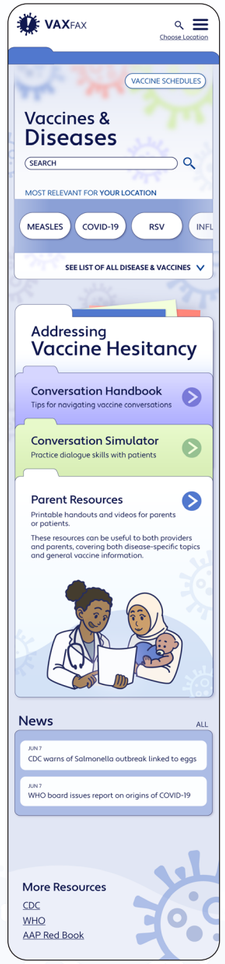
Description:

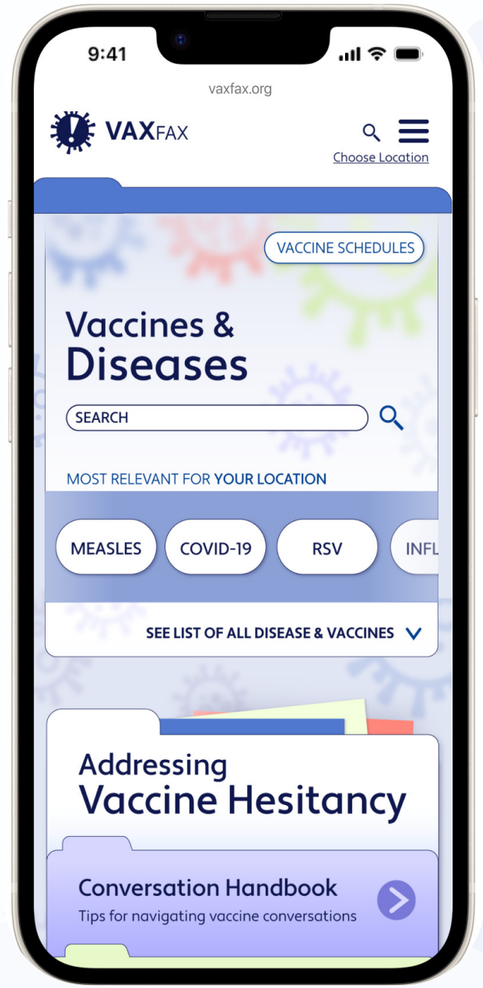
Users interact with the homepage upon entering the website. This landing page allows access to all of the website pages and tools. The user can scroll through the homepage and access additional resources from the provided links. The “News” section at the bottom displays the most current up to date news about vaccine preventable diseases.

User Action:

The users’ location is automatically detected, but users can manually change locations if they wish. Location information determines which diseases show up as “Most Relevant for Your Location.” Vaccine schedules can be accessed by clicking the “Vaccine Schedules” button on the top right. Clicking the disease buttons in the “Most Relevant” section will navigate to that specific disease page. Users can scroll horizontally to view all of the “most relevant” diseases. Selecting the arrow next to “See List of All Disease and Vaccines” reveals a list of all available pages about a specific disease or it’s vaccine. To access pages about vaccine hesitancy, users may select the arrow button on the folders within the “Addressing Vaccine Hesitancy” section of the homepage.

Storyboards
Homepage





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Storyboards

Home Page

Description:

A list of vaccines and vaccine-preventable diseases accessed on the homepage.

User Action:

Users can click “See List of All Diseases and Vaccines’ to view lists of all available vaccine or disease pages. Clicking the “All Vaccines” and “All Diseases” tabs will toggle between the two lists. Clicking on the underlined disease or vaccine will direct users to that specific page. Lists can be hidden by selecting the “See Less” arrow in the bottom right.

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Storyboards

Measles Page

Description:

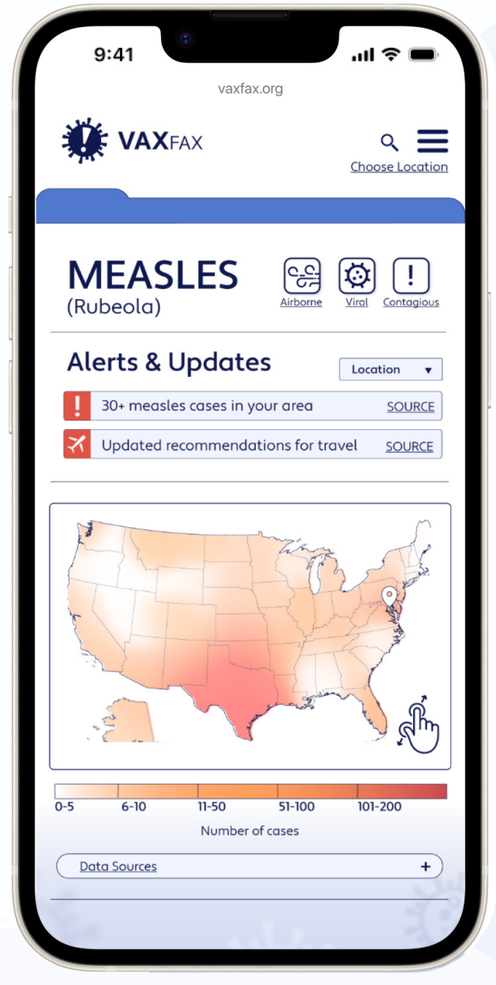
Key points about measles, alongside icons representing transmission route, pathogen type, and infectiousness are diplayed. Icons are standard across disease pages. A heatmap of US measles cases is displayed, along with any specific alerts for a user's selected location. Links to primary sources for alerts and data are available at the bottom of the screen.

User Action:

Users can search the page content using the search icon in the upper right, Manually entering location will alter alerts, and users can zoom in and pan around the measles heatmap. As they scroll, users can click on labeled buttons to open pages about more specific measles content.

Storyboards

Measles Page



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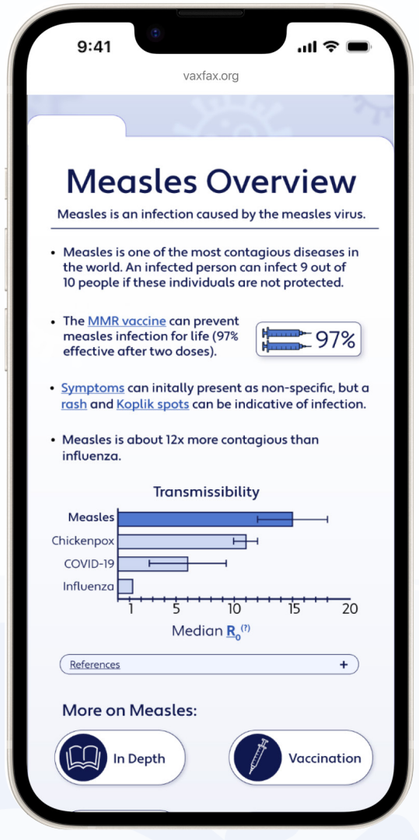
Storyboards

Measles Page

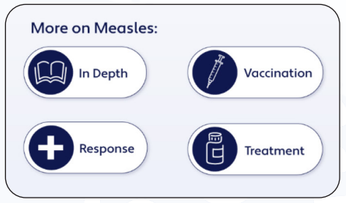


Description:

The measles overview section of the measles page has a short, bulleted list of key facts about measles transmission, infection, and vaccination. A graph shows the median R_0 of measles compared to other infectious diseases.[13-17] Primary sources are linked in proximity to data and facts.

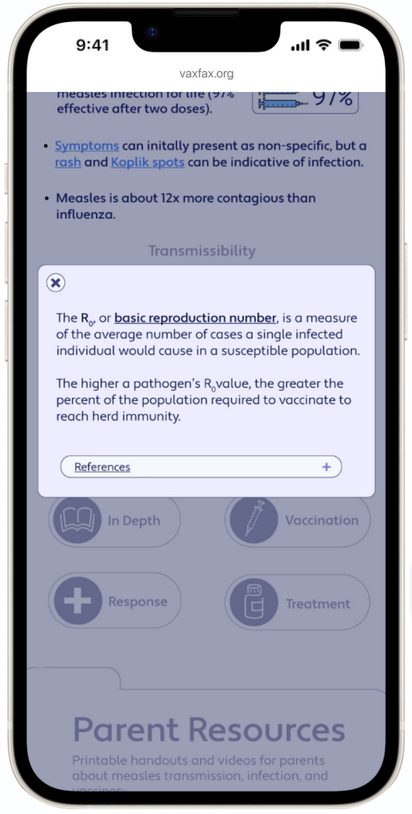
User Action:

As users scroll, they can select from 4 different buttons (Vaccination, Treatment, Response, and In Depth) to be redirected to pages on those topics with references.



Storyboards

Measles Page



Description:

A pop-up displays quick definitions for key terms throughout the measles page. References are linked at the bottom of each pop-up for further review.

User Action:

Important concepts are clickable within the the text. When clicked, a pop-up displays the definition and provides additional references. These pop-ups can be closed by clicking the “X” in the upper left. Reference are accessed by clicking the “References” button.

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Storyboards

Measles Page

Description:

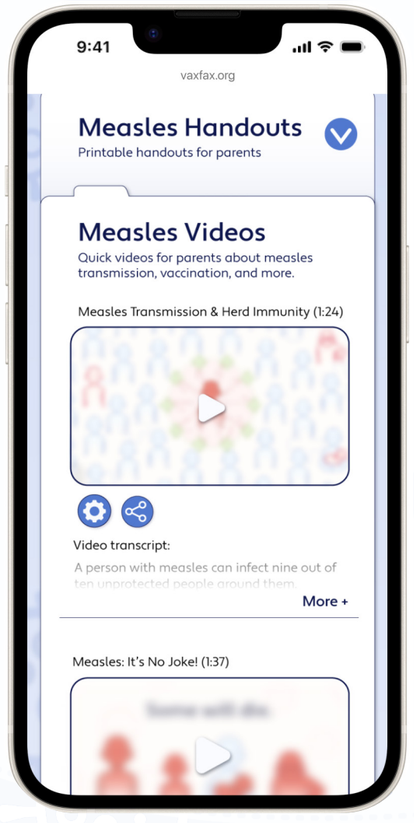
Measles-specific patient and parent handouts are available on the measles page in various languages. Handouts are searchable and printable. Videos have transcripts available and can be played in the website interface.

User Action:

Users scroll to navigate to the Parent Resources section, where they can choose a “folder” to drop down by clicking the arrow button on the respective folder. This expands the folder, allowing the user to view the contents. Separate folders contain handouts and videos.

Storyboards

Measles Page



Description:

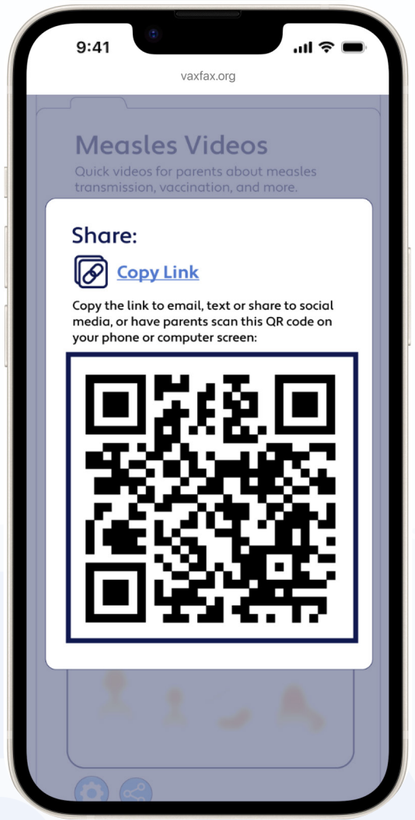
An introductory video designed for general audiences about measles transmission in vulnerable populations, explaining the concepts of vaccination and herd immunity. Subtitles and audio descriptions are available for users, as well as different language options. The video plays through the site but is hosted offsite for ease of sharing.

User Action:

Users can press the play button to watch the video. Clicking the gear icon allows users to change the language for narration and subtitles. Users can also press the share button to access a link and QR code for the video that they can easily share with patients.

Storyboards

Measles Page



Description:

A pop-up displaying a QR code and shareable link is available for each video on the site under the share icon button.

User Action:

Users can either click the “Copy Link” text to copy the video link or share the QR code from their device. The pop-up can be closed by clicking anywhere outside of it.

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Storyboards

Conversation Handbook

Description:

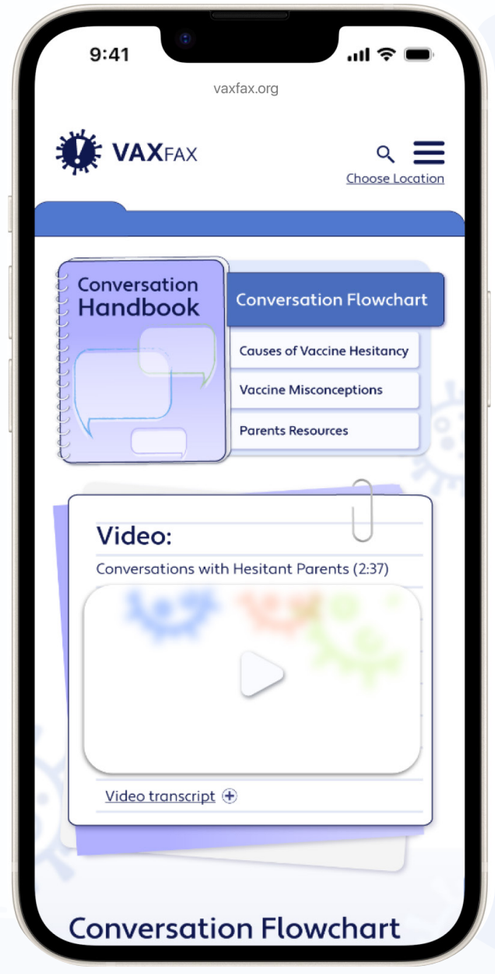
“Conversation Flowchart” is the landing page for the Conversation Handbook. This page introduces users to a video and written content outlining best practices for discussing vaccines with hesitant parents. The majority of the page is a flowchart for vaccine conversations, outlining evidence-based ways for providers to engage with vaccine-hesitant parents to increase vaccine uptake.

User Action:

Users may select a “section” of the Conversation Handbook at the top of the page. Each section is a different webpage. Users can watch a short video summarizing the topic, which includes subtitles, a transcript and audio descriptions. Clicking the underlined “Video transcript” text will give the user access to the transcript. Users can scroll to further to access the Conversation Flowchart contents.

Storyboards

Conversation Handbook



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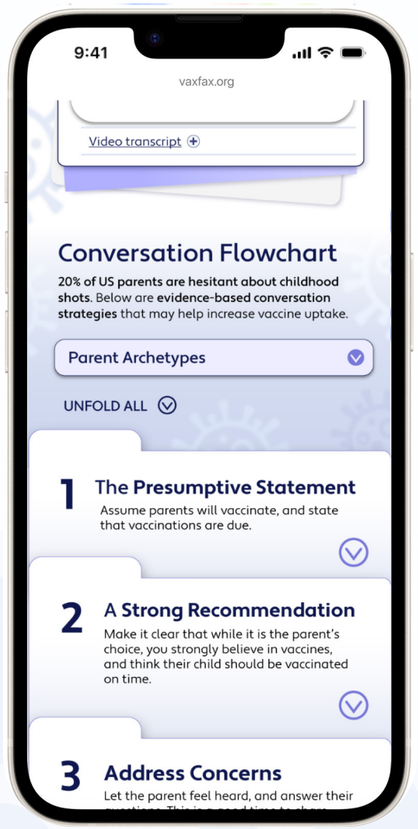
Storyboards

Conversation Handbook



Description:

The Conversation Flowchart outlines conversation strategies for discussions with vaccine hesitant parents. Each step is within its own folder, with a brief explaination visible outside of the folder contents. Additional information for providers about common parent archetypes is available above the flowchart.

User Action:

Users can scroll down the page to access the Conversation Flowchart, clicking the drop down arrows on each respective concept to “unfold” addtional information. Alternatively, selecting the “Unfold All” button will unfold all folders at once. Clicking the ‘Parent Archetypes” button will reveal drop-down content describing common parent archetypes.

Storyboards

Conversation Handbook

Description:

The Parent Archetypes lists the 5 common archetypes of parents a provider may encounter. The name and description of the archetype is available next to an icon.

User Action:

Users can scroll to view all five of the parent archetypes and their definitions. The drop-down can be closed by pressing the “See Less” arrow at the bottom of the archetypes drop down.

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Storyboards

Conversation Handbook

Description:

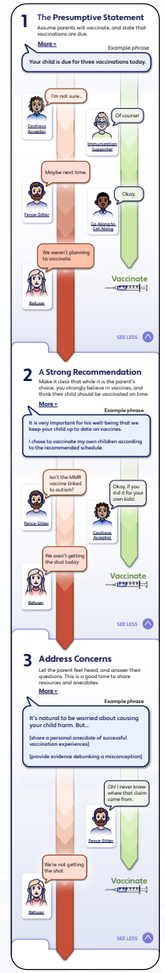
After “unfolding” the Conversation Flowchart, users will see an example phrase utilizing the specific conversation strategy outlined in that step of the flowchart. Two pathways emerge below the example phrase, each with different parent archetypes and their imagined responses to the example phrase. Based on their archetypical behavior, parents will either choose to vaccinate their child (successful outcome, right side) or remain unconvinced (unsuccessful outcome, left side). Subsequent steps in the flowchart address additional conversation strategies to increase vaccine uptake in the unconvinced archetypes.

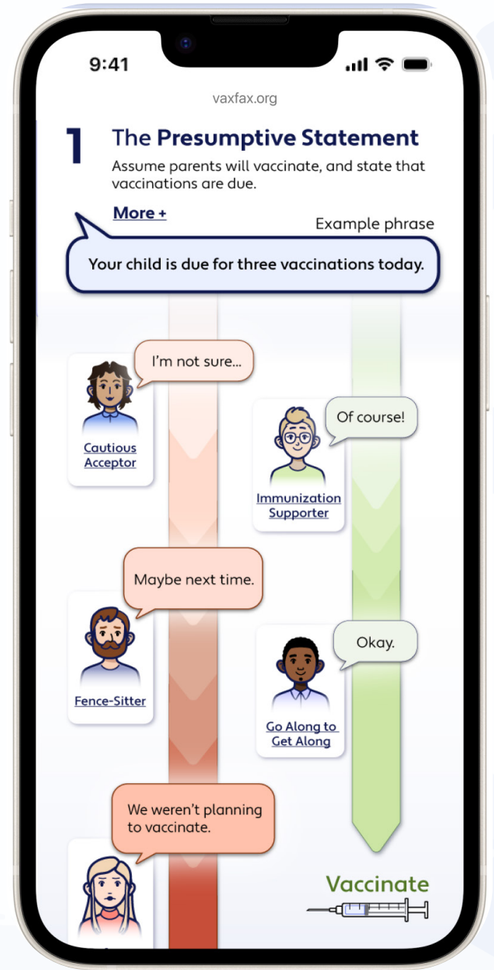
User Action:

Users can scroll through the flowchart to access more conversation strategies. Clicking on the icons for the displayed parent archetypes will reveal a pop-up with the names and descriptions of all five archetypes, identical to the one accessible under the “Parent Archetypes” button at the top of the flowchart. The “More+” text under each step’s definition will display a pop-up with additional context and references.

Storyboards

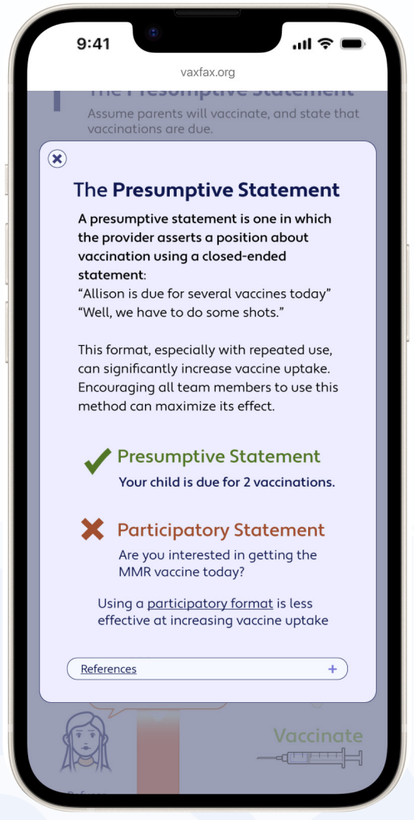
Conversation Handbook





Storyboards

Conversation Handbook



Description:

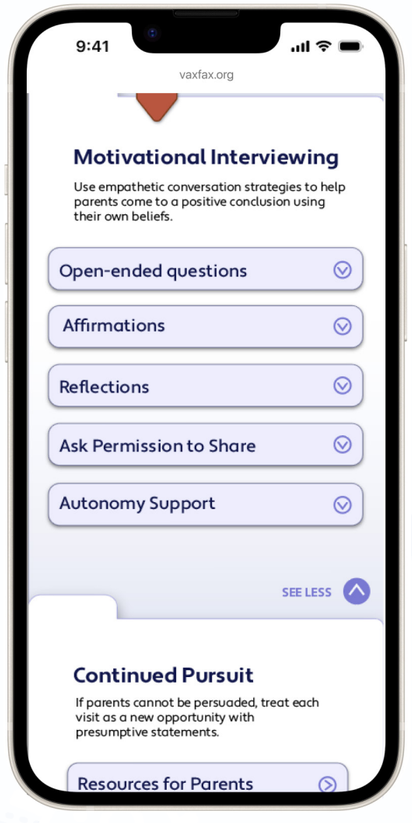
A pop-up screen with more information accessible under each step in the conversation flowchart. Example phrases for effective and ineffective techniques can be read quickly, and references are accessible at the bottom of the pop-up.

User Action:

To close the pop-up, users can click the "X" in the upper left corner. The references can be accessed by pressing the "Reference" button.

Storyboards

Conversation Handbook



Description:

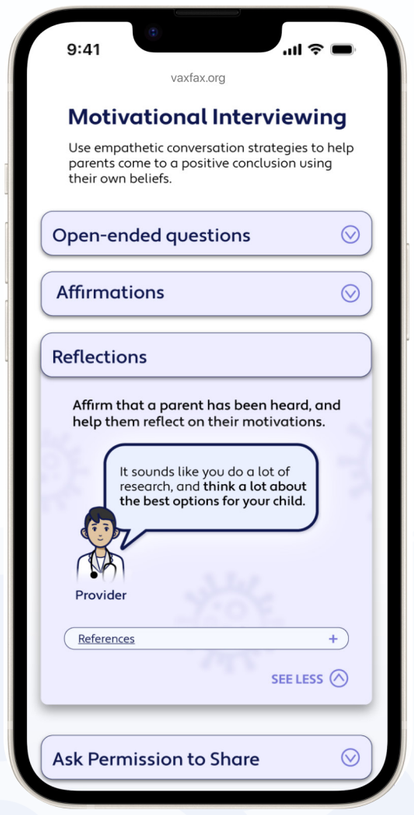
Within the the Motivational Interviewing section of the Conversation Flowchart, numerous conversation techniques are listed.

User Action:

Detailed information and primary sources are available in a drop-down for each technique in the Motivational Interviewing folder. Users can access these technique by clicking the tenchiquebutton or arrow within the button. "Folders" in the Conversation Flowchart can be condensed by clicking the "See Less" arrow available at the bottom of each step.

Storyboards

Conversation Handbook



Description:

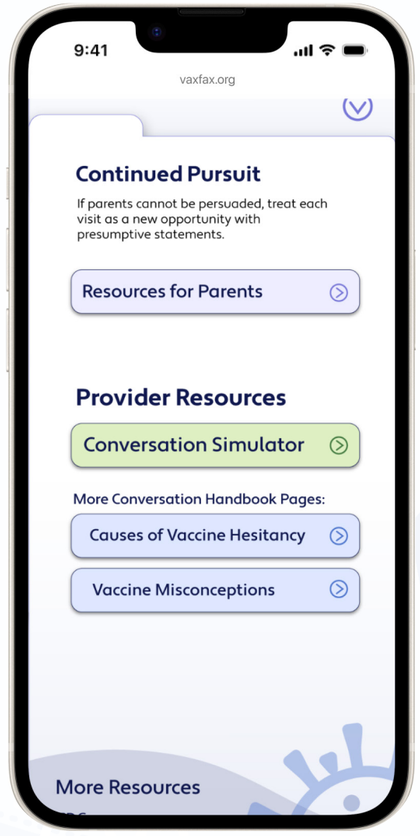
Unfolded techniques in the Motivation Interviewing step have a brief description, along with an example phrase. References are available at the bottom of each drop-down.

User Action:

Users click the button or arrow on the button to drop-down the information. The technique can be hidden by pressing the ‘See Less” arrow on the bottom right. The “References” button will link to the references for the technique.

Storyboards

Conversation Handbook



Description:

At the bottom of the Conversation Flowchart, there are additional buttons for providers to access addtional parent resources, more Conversation Handbook pages, or the Conversation Simulator. Resources outside of the VaxFax website are available under more resources at the bottom of each page.

User Action:

Clicking a page-specific button will send users to the respective page. Clicking the underlined text of each outside organization will direct the user to that organization’s external website.

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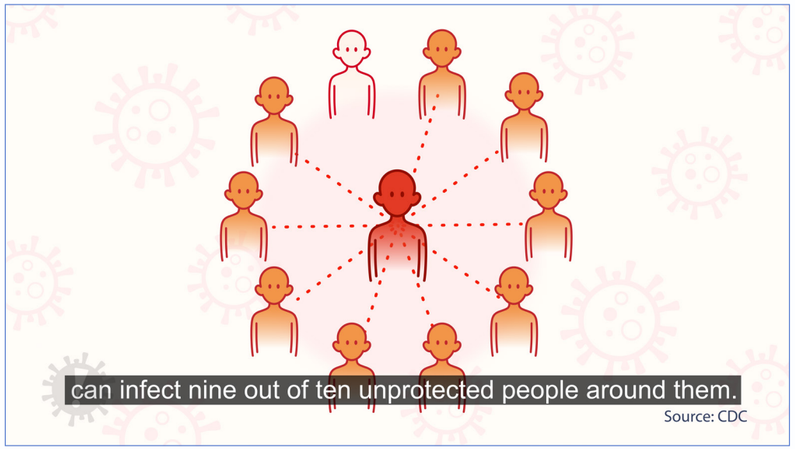
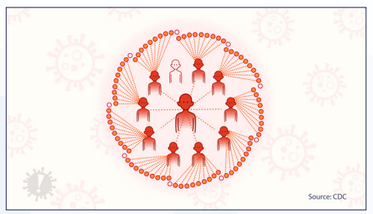
Storyboards

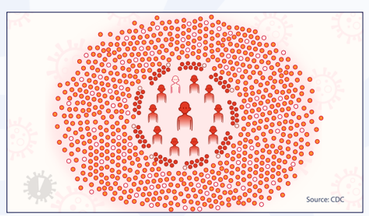
Parent Video: Measles Transmission and Herd Immunity



“A person with measles can infect nine out of ten unprotected people around them.”

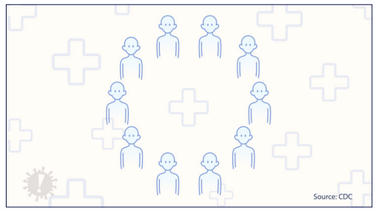


“Each of these people can infect another nine out of ten,”

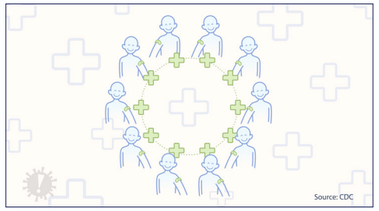


“And so on, which is why measles is considered one of the most contagious diseases.”

Storyboards



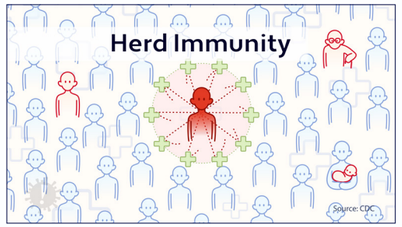
“But we usually don’t see measles in the United States,”



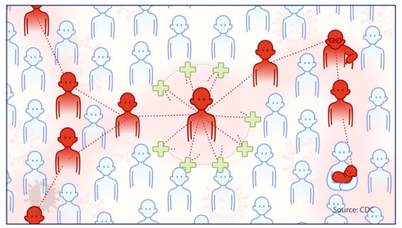
“Because almost every person is vaccinated. Vaccines prevent measles almost 100% of the time.”

“When enough people are vaccinated, measles has nowhere to spread.”

Storyboards

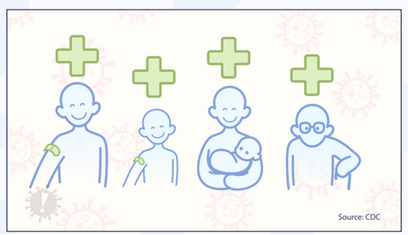


"People who are sick or too young to get vaccinated are protected by people who are immune. This is called herd immunity."



"If not enough people are vaccinated, herd immunity doesn't work."

"Vulnerable people who are exposed to measles almost always get sick. Some will die, and some will be affected for life."



"But it's 100% preventable. Vaccines protect you, your family, and everyone you know."

 Allison Abel | Elise Butler | Melody Zhang

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