Recognizing the Pandemic:
Identifying the “AR Pandemic” within the Pandemic

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Prioritizing prevention to fight AR

CDC supports prevention activities to achieve ambitious goals outlined in the *Combating Antibiotic-Resistant Bacteria (CARB) National Action Plan, 2015 – 2020 & 2020 – 2025,* across:

Antibiotic/antifungal use and access: Improve use of antibiotics/antifungals, reduce unnecessary use (stewardship), and ensure access to these drugs

Infection prevention and control: Prevent infections and reduce the spread of germs

Tracking and data: Share data and improve collection to stay ahead of AR

Vaccines, therapeutics, and diagnostics: Invest in development and improved access for better prevention, treatment, and detection

Environment and sanitation: Keep antimicrobials and antimicrobial-resistant threats from entering the environment

CDC works across settings on this One Health problem

EMERGING INFECTIONS PROGRAM

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AR ISOLATE BANK

NWSS NATIONAL WASTEWATER SURVEILLANCE SYSTEM

NHSN NATIONAL HEALTHCARE SAFETY NETWORK

BE ANTIBIOTICS AWARE SMART USE, BEST CARE

PulseNet USA The National Molecular Subtyping Network for Foodborne Disease Surveillance CDC

Global Antimicrobial Resistance Lab & Response Network

Building capacity through the Domestic AR Lab Network

- Transform the national lab infrastructure with regional and local labs with gold-standard methods and technology
- Enhanced testing capacity in all 50 states, local jurisdictions, and Puerto Rico
- Faster detection for rapid and improved public health response
- Communication channels to engage clinical laboratory partners
- Real-time, actionable data and alert system

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Pathogen Identification
Knowledge is power

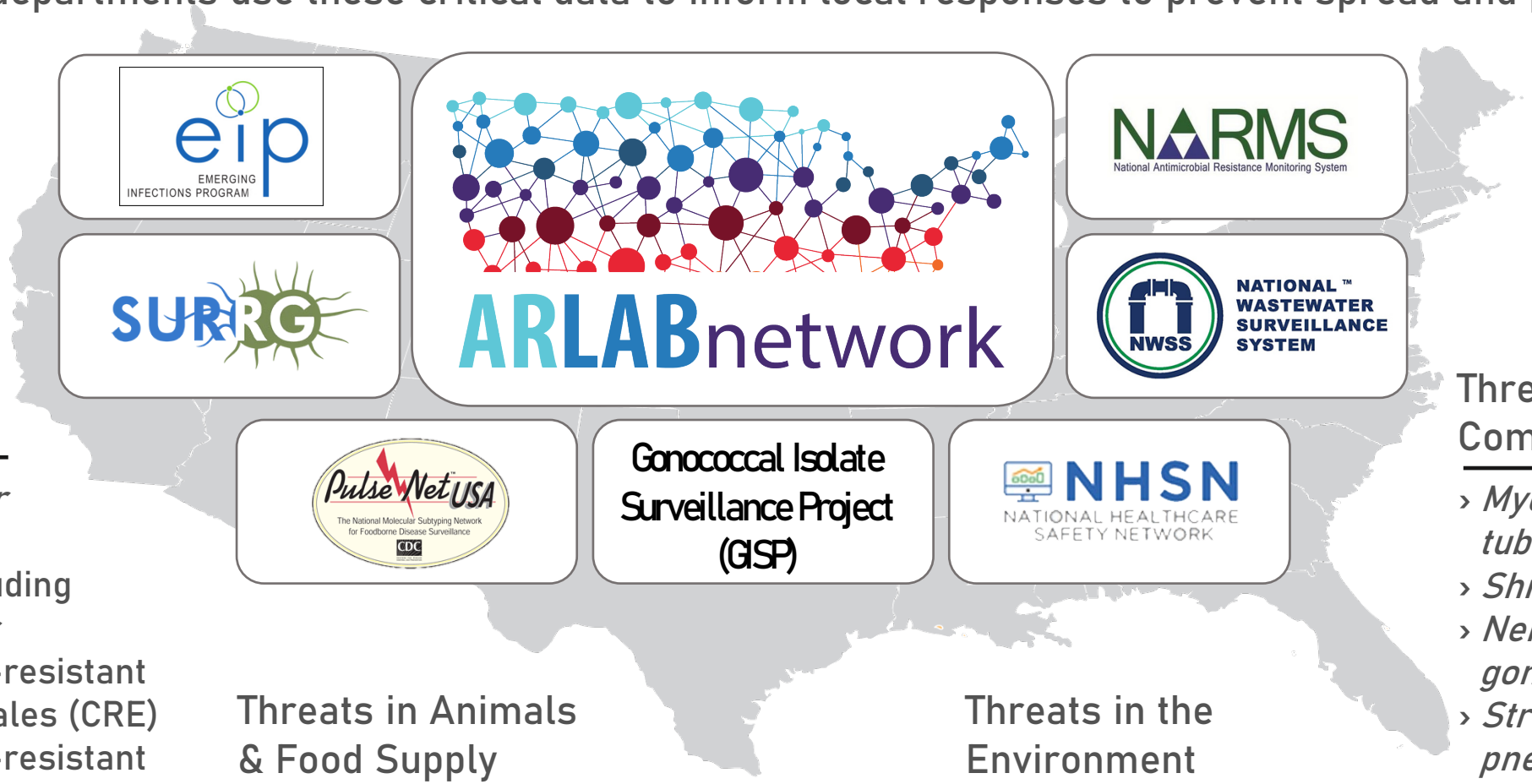
AST / AFST
Helps decide which antibiotic/antifungal to use

PCR / WGS
Identifies resistance mechanisms and helps link cases to identify outbreaks

Infections / Colonization
Prompts infection control

Keeping a pulse on top U.S. AR threats by testing

CDC uses several data sources and systems to track antimicrobial resistance in the U.S. and abroad. CDC's Antimicrobial Resistance Laboratory Network (AR Lab Network) is one of the leading nationwide systems. CDC and health departments use these critical data to inform local responses to prevent spread and protect people.



Threats in Health Care

- *Acinetobacter* species
- *Candida*, including *Candida auris*
- Carbapenem-resistant Enterobacterales (CRE)
- Carbapenem-resistant *Pseudomonas aeruginosa*
- *Clostridioides difficile*

Threats in Animals & Food Supply

- *Campylobacter*
- *Salmonella* (Typhi and non-Typhi)

Threats in the Environment

- Azole-resistant *Aspergillus fumigatus*

Threats in the Community

- *Mycobacterium tuberculosis* (TB)
- *Shigella*
- *Neisseria gonorrhoeae*
- *Streptococcus pneumoniae*

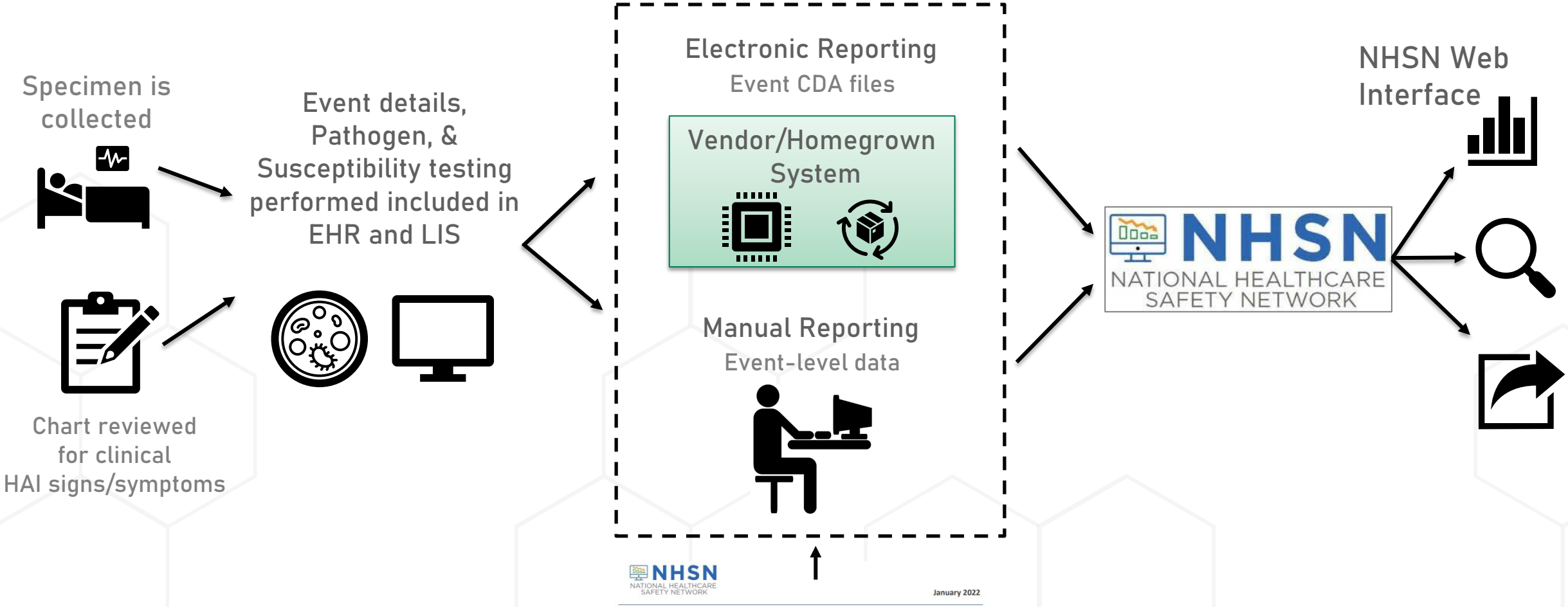
National Healthcare Safety Network: The nation's healthcare surveillance system

NHSN
NATIONAL HEALTHCARE SAFETY NETWORK

- The USG trusted healthcare surveillance platform for infectious diseases, patient-safety events, and healthcare preparedness with advanced data automation and user interfaces that provide precise and actionable data
  - This highly adaptable and comprehensive system provides reliable data from all healthcare facility types to capture and analyze infection data, drive improvement in healthcare quality and patient safety, and stop the spread of infections to save lives
  - Supports CMS' large pay-for-performance/value-based purchasing programs as well as provides surveillance for other patient safety threats

- 130,727 active users
- >11,000 users per day
- 37,763 facilities
- 39,626,962 patient-records
- In 2021, imported and processed 8.8 million Clinical Document Architecture (CDA) files & 2.7 M CSV files
  - Over 59 vendors submitting CDA on behalf of >8,000 facilities via NHSN DIRECT (Rosetta Health HISP)
- Processed >33.9 million Point of Care (POC) COVID-19 test reports through NHSN to APHL AIMS platform for reporting to states & jurisdictions
- Closed >90,00 Help Desk tickets in CY21

Flow of HAI pathogen and AR data: From bedside to NHSN patient safety component



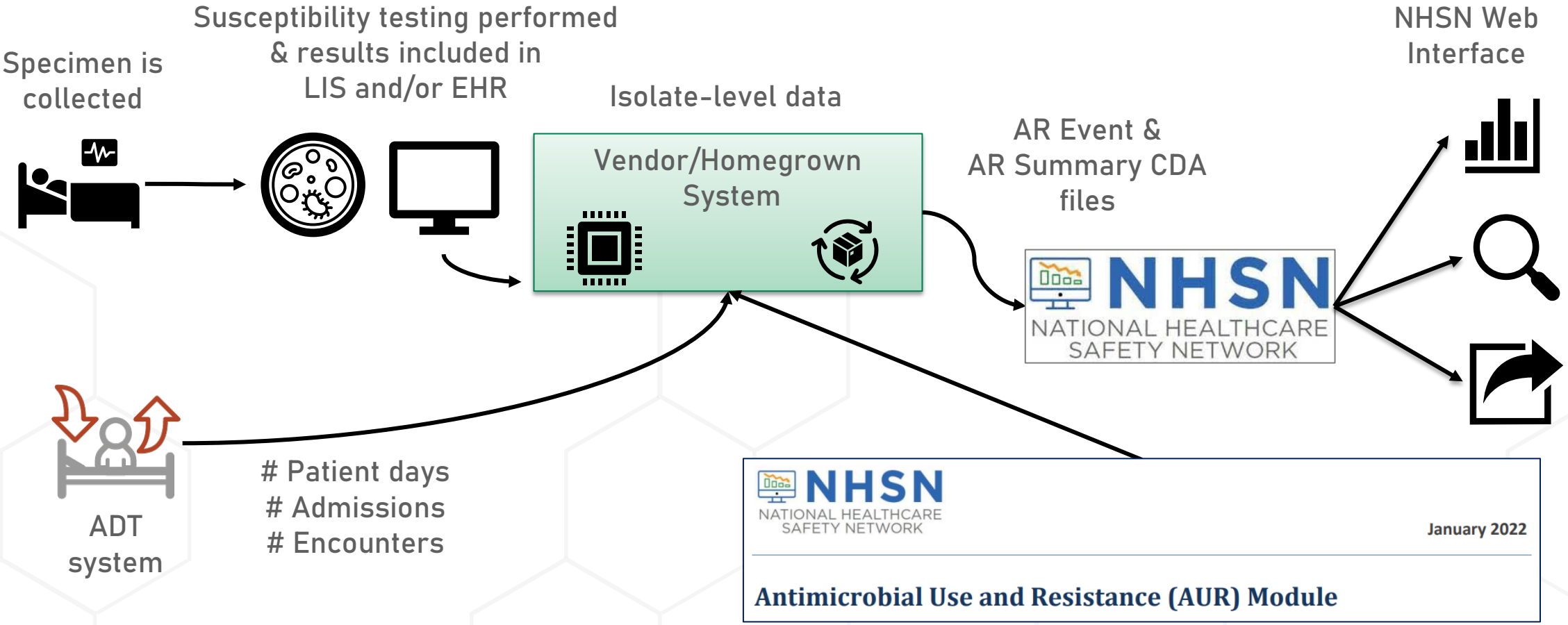
EHR: Electronic Health Record
LIS: Laboratory Information System
CDA: Clinical Document Architecture

National Healthcare Safety Network (NHSN)

Patient Safety Component Manual

https://www.cdc.gov/nhsn/acute-care-hospital/index.html

Flow of AR data: From bedside to NHSN AR Option



Starting in 2024, antibiotic use and antimicrobial resistance (AUR) will be a required measure for the CMS Hospital Inpatient Prospective Payment System.

LIS: Laboratory Information System; EHR: Electronic Health Record; ADT: Admission Discharge Transfer System; CDA: Clinical Document Architecture

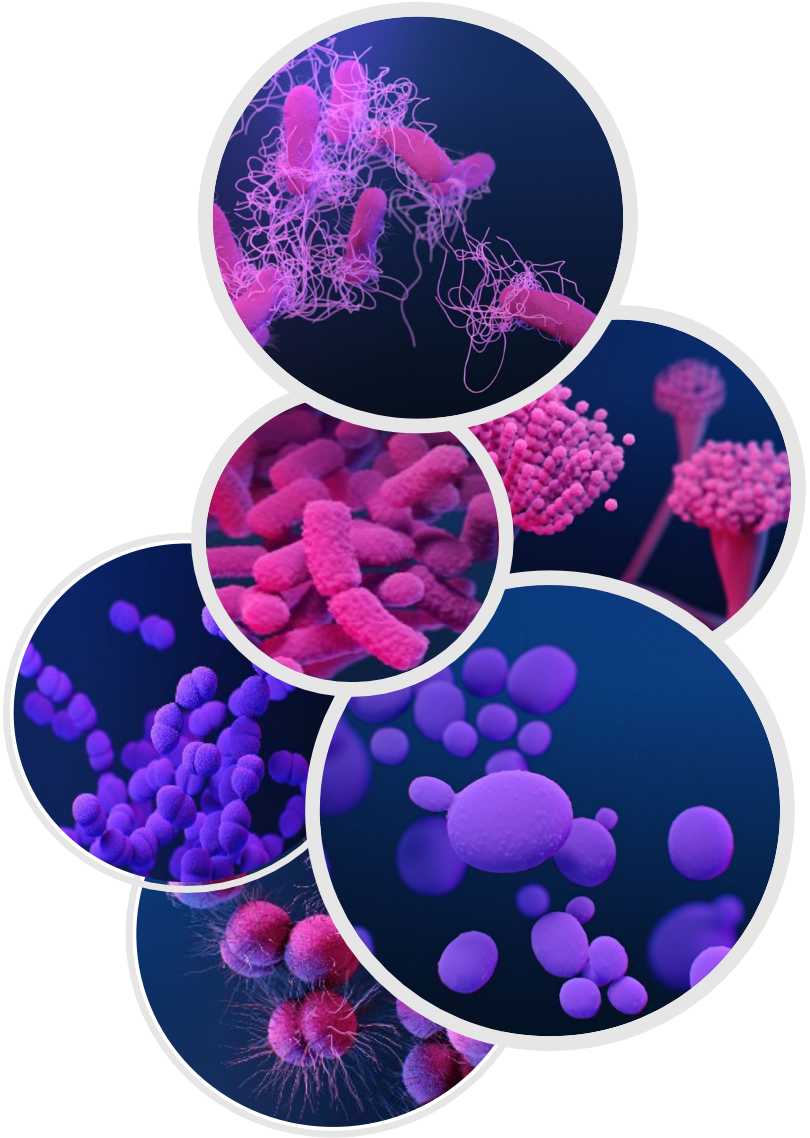
https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf

Healthcare-Associated Infections-Community Interface (HAIC) Activity

- Captures healthcare-associated infections plus community-associated, community-onset disease, including isolates (11-25 million persons under surveillance in 7-10 sites)
- Organisms/infections under surveillance:
  - *Clostridioides difficile* infections (CDI)
  - *Candida* spp. bloodstream infections
  - Invasive *Staphylococcus aureus* infections
  - Carbapenem-resistant Enterobacterales, *Acinetobacter baumannii* (CRE, CRAB)
  - Extended-spectrum beta-lactamase (ESBL) producing Enterobacterales
  - Non-tuberculous mycobacteria (NTM)
- Antimicrobial use prevalence surveys
- Healthcare personnel COVID-19 surveillance
- Evaluation of the epidemiology and public health impact of HAIs, AR, AU, and other healthcare-related ADEs; assessment of the effect of HAI and AR prevention and control strategies; identification of health disparities.

CDC's Global AR Lab & Response Network

- A global collaborative network to address priority emerging AR threats using a One Health approach for rapid detection and response to resistant organisms in healthcare, community, food, and the environment that impact human health.
- Build sustainable testing for detection of high impact bacterial and fungal AR threats, based on local needs and capacity, for effective and rapid response.
- Enhance communication between lab and epi, and foster knowledge sharing among partners.



High-Impact AR Pathogens included:

- HAIs – carbapenem-resistant Enterobacterales [GAIHN]
- Enterics – *Salmonella* (Typhi and non-typhi) [PNI]
- Enterics – drinking, surface, and wastewater [WASH]
- Fungi – *Candida* spp, inc *C. auris*, and *Aspergillus*
- Inv. Bac and Resp – *S. pneumoniae, N. meningiditis, B. pertussis*
- STDs – *Neisseria gonorrhoeae* [EGASP]

National Wastewater Surveillance System (NWSS)

- In 2020, researchers leveraged an existing project funded by CDC's AR Solutions Initiative focused on antimicrobial resistance to better understand the burden of COVID-19 in communities—using wastewater.
- 46 states, 5 major cities and 2 territories using CDC funds for wastewater surveillance
- Commercial testing contract services 315 sites nationwide, prioritizing vulnerable communities
- Weekly sequencing
- >83,000 unique wastewater samples from >1200 sites in the NWSS data system representing >130M people
- 5 benefits of wastewater surveillance for antimicrobial resistance: Captures silently spreading germs, operates independently of healthcare and clinical capacity, is efficient, moves fast, and provides an early warning system.

What's Next for NWSS

NATIONAL WASTEWATER SURVEILLANCE SYSTEM

- Expanding the capacity of NWSS to collect antimicrobial resistance data from wastewater treatment plants and healthcare facilities to continue infectious disease surveillance.
- Studying antimicrobial resistance in community and healthcare wastewater, domestically and globally.
- Will include-
  - Fecal normalization control
  - Process control
  - Antimicrobial resistance genes
  - Pathogen targets (e.g., *Candida auris*)
- Reviewed annually by CDC NWSS Advisory Committee
- Additional assays developed for emergency use
- Improvements - Extending coverage, 20% unsewered; Optimal geographic and temporal sampling frame for multiple targets; Improved methods, streamlined workflow

What's Needed

To tackle AR threats when they ***inevitably*** emerge:

- Funding Sustainability (short term supplement funding will expire in the next couple years) of critical AR surveillance programs that turn data into prevention:
  - AR Lab Network (domestic)
  - Global Action in Healthcare Network
  - Global AR Lab & Response Network
  - National Healthcare Safety Network (NHSN)
  - National Wastewater Surveillance System (NWSS)
  - EIP Healthcare-Associated Infections-Community Interface (HAIC) Activity
  - Other AR systems not relevant to today's discussion but could be important under different pandemic scenarios (e.g., for tuberculosis, gonorrhea, enterics, bacterial pneumonias)

Tracking AR, including detection and reporting data, slowed tremendously during the COVID-19 pandemic.

CDC's AR Lab Network received and tested 23% fewer specimens or isolates in 2020 than in 2019.

What's Needed (continued)

To tackle AR threats when they ***inevitably*** emerge:

- Funding sustainability (short term supplement funding will expire in the next couple years) for health departments and healthcare facilities. We will need a more robust workforce, increased laboratory expertise, ongoing training (e.g., Project Firstline) and infection prevention control capacity, especially for new NHSN AU and AR reporting requirements beginning in 2024
- Supporting uninterrupted supplies and equipment for laboratory testing, patient care, infection control, and data tracking during emergencies and surge outbreaks

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