Candida auris Globally and in New York State: A Call to Action

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Outline

- Background and emergence
- Reason for concern
  - Identification
  - Resistance
  - Transmission in healthcare facilities
    - UK outbreak
- Presence in the United States and New York State
- Infection control
- New York State control activities
- CDC Recommendations and NYSDOH Plans

First Reported from Japan, 2009

Candida auris sp. nov., a novel ascomycetous yeast isolated from the external ear canal of an inpatient in a Japanese hospital

Kazuo Satoh[1,2], Koichi Makimura[1,3], Yayoi Hasumi[1], Yayoi Nishiyama[1], Katsuhisa Uchida[1] and Hideyo Yamaguchi[1]

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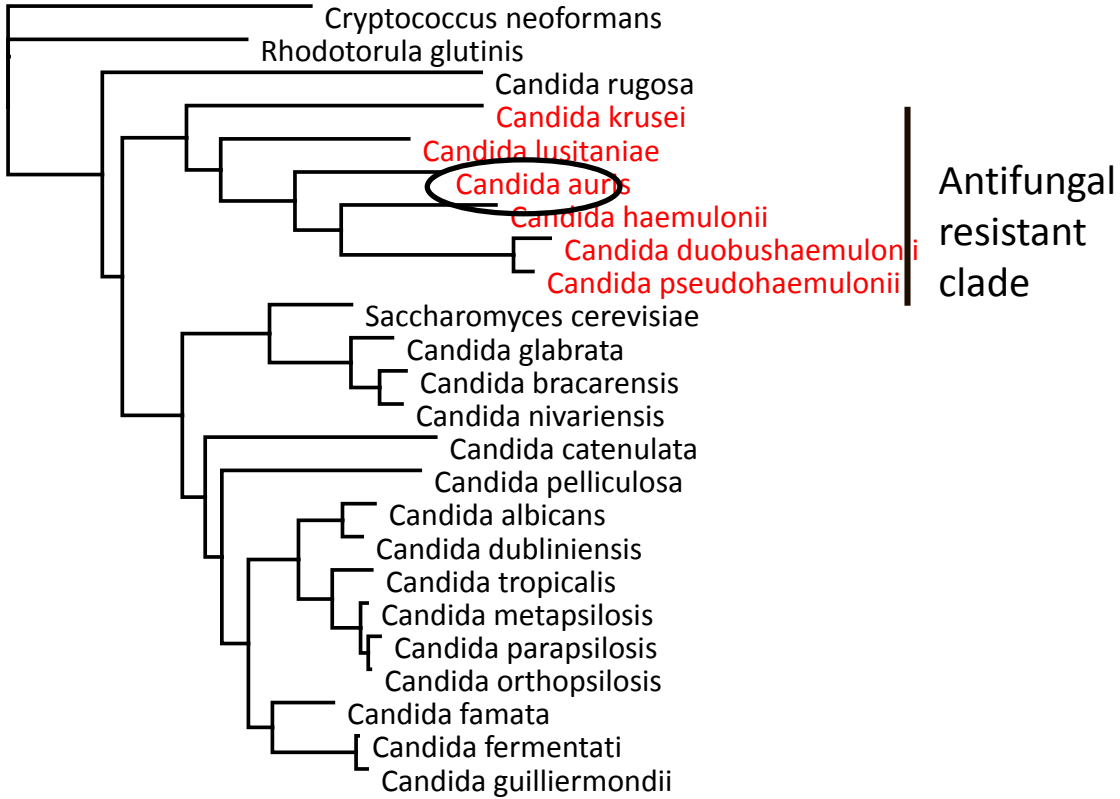
Satoh K, Makimura K, Hasumi Y, et al. *Candida auris* sp. nov., a novel ascomycetous yeast isolated from the external ear canal of an inpatient in a Japanese hospital. Microbiol Immunol. 2009;53:41–4.

Candida auris



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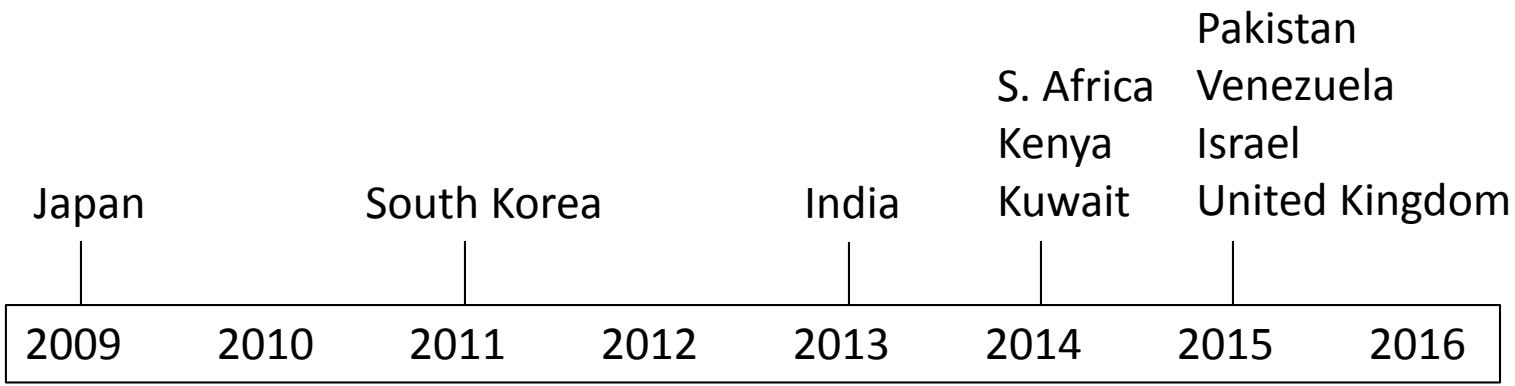
Rapid Emergence Since 2009



C. auris in Korea

- Korea
  - Kim 2009: described novel species related to *C. haemulonii*, isolates from 2006, patients with chronic otitis media
  - Lee 2011: described 3 cases of hospital-acquired *C. auris* bloodstream infection (1996, 2009 x2)
  - Oh 2011: 12 isolates from ear specimens of patients with frequent ear procedures/manipulation, found shared PFGE patterns within hospitals, suggests transmission

C. auris in India

- India
  - Chowdhary 2013: 12 bloodstream isolates from 2009-2011, 2 hospitals in Delhi, clonal (suggesting transmission between hospitals) and distinct from Japan and South Korea isolates, represented 5% of candidemia in pediatric hospital, 30% of candidemia in tertiary general hospital, all fluconazole resistant
  - Sarma 2013: two candidemia isolates misidentified as *C. haemulonii* found to be *C. auris* by sequencing, resistant to fluconazole and amphotericin B
  - Chowdhary 2014: 15 *C. auris* isolates from 12 patients in one hospital in south India (fungemia, gangrenous foot, pneumonia), all resistant to fluconazole, 11 resistant to voriconazole, some also resistant to flucytosine and with high MICs to caspofungin, clonal with isolates from north India, distinct from Korean and Japanese isolates, 4/11 died

C. auris in India

- India (cont)
  - Chakrabarti 2015: *C. auris* isolated from 19/27 ICUs throughout India, 5.2% of ICU Candida isolates
  - Kathuria 2015: 102 isolates from 6 sites in Delhi and Kochi, automated system identified them as *C. haemulonii* or *C. famata*, 90 (88%) identified as *C. auris* by sequencing, resistant to fluconazole, some with elevated caspofungin MICs, resistance profiles varied by method

C. auris around the World

- Elsewhere
  - Magobo 2014: South Africa, 4 patients with *C. auris* fungemia 2012-2013, related to Indian isolates
  - Emara 2015: Kuwait, fatal *C. auris* fungemia
  - Lockhart 2016: reports cases from Pakistan and Venezuela
  - Borman 2016: reports 21 cases since 2013 in the United Kingdom, including an outbreak
  - Calvo 2016: 18-patient outbreak in a Venezuela hospital, clonal, mean of 24 days from admission to positive culture

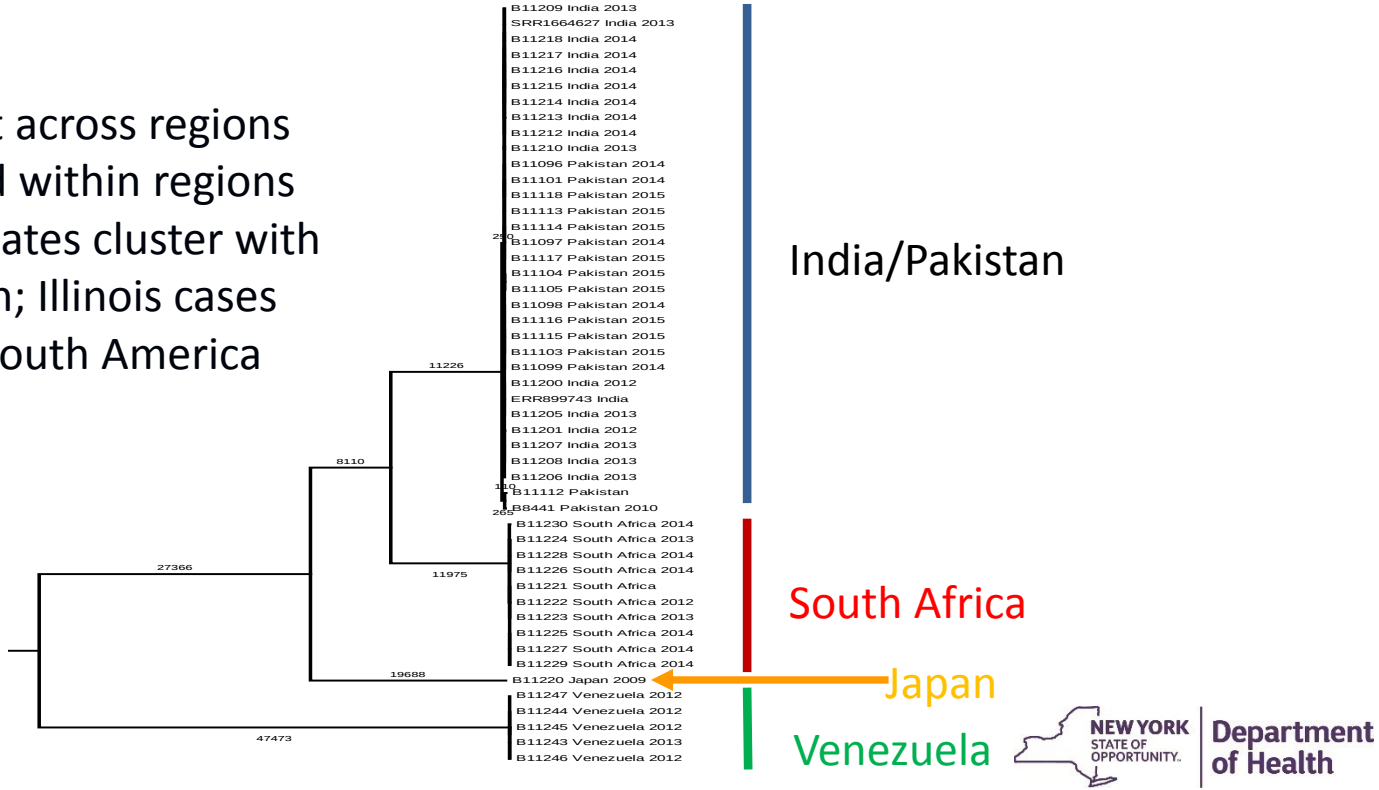
C. auris around the World

- Lockhart 2016: 54 isolates from Pakistan, India, South Africa, Venezuela, and Japan
  - Susceptibility testing
    - 93% resistant to fluconazole, 54% to voriconazole, 35% to amphotericin B, 7% to echinocandins, 6% to flucytosine
    - 41% resistant to ≥2 classes, 2 isolates resistant to 3 classes
  - Whole genome sequencing
    - 4 clades: South Asia, South Africa, South America, East Asia
    - Minimal differences among isolates within a geographic cluster
    - Suggests simultaneous emergence rather than spread
  - Surveillance
    - SENTRY: 15,271 Candida isolates 2004-2015, four *C. auris* identifications after 2009
  - Selection pressure from antifungals?

CDC Whole Genome Sequencing

Strains were:

- Very different across regions
- Highly related within regions
- Most U.S. isolates cluster with India/Pakistan; Illinois cases cluster with South America



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Reason for Concern

- Challenging to identify
  - Often misidentified as *C. haemulonii*, other *Candida* spp., or *Saccharomyces*
  - MALDI-TOF or sequencing required to correctly identify *C. auris*

Reason for Concern

- Often multi-drug resistant
  - Usually resistant to fluconazole, variable susceptibility to other azoles, amphotericin B, and echinocandins
  - Some have been resistant to all 3 classes of antifungal medications
- Mortality rates 30-60%

Reason for Concern

- Transmitted within healthcare facilities
  - Outbreak of 30 cases in Pakistan
  - Outbreak in UK ICU
    - Persistent colonization
    - Survives in hospital environment; outbreak difficult to control

C. auris Hospital Outbreak – London (Schelenz 2016)

- Cardiothoracic surgery hospital in London
- First 16 months of ongoing outbreak
  - 1st: patient with a sternal wound in ICU
  - 2nd: sputum of patient in adjacent bed (later developed intravascular infection)

C. auris Hospital Outbreak – London

- 50 cases, gaps and clusters
- Environmental cultures positive
  - Floor, carts, radiators, windowsills, monitors, key pads, one air sample
- Spread to wards

C. auris Hospital Outbreak – London

- Outbreak strain
  - Resistant to fluconazole, variable susceptibility to other antifungals
  - Molecular testing suggested these isolates form a cluster, highly related
    - Single introduction into the hospital

C. auris Hospital Outbreak – London

- Clinical characteristics
  - 22/50 patients required therapy (others were colonized only)
    - Echinocandin, amphotericin B, 5-flucytosine
  - Some developed candidemia despite use of an echinocandin
  - Admission screening cultures were almost all negative (1/2246 positive)

C. auris Hospital Outbreak – London

- Infection control measures
  - Isolation of infected and colonized patients for duration of admission
  - Isolation and cohorting of contacts
    - Off isolation when screening culture negative x3
    - Cultured weekly until discharge
  - Closure of affected rooms to new admissions
  - Strict Contact Precautions
    - Healthcare workers and visitors

C. auris Hospital Outbreak – London

- Healthcare worker screening cultures
  - Hands, nose, axilla, groin, throat
  - 1/258 positive (nose)
- Attempted decolonization of patients
  - Chlorhexidine washes, mouthwash with chlorhexidine, oral nystatin
  - Continued colonization

C. auris Hospital Outbreak – London

- Environmental decontamination
  - Chlorine-based product 3 times per day
  - Terminal clean with chlorine-based product and hydrogen peroxide vapor

CDC Clinical Alert June 2016

Fungal Diseases

Clinical Alert to U.S. Healthcare Facilities

Global Emergence of Invasive Infections Caused by the Multidrug-Resistant Yeast *Candida auris*

Summary: The Centers for Disease Control and Prevention (CDC) has received reports from international healthcare facilities that *Candida auris*, an emerging multidrug-resistant (MDR) yeast, is causing invasive healthcare-associated infections with high mortality. Some strains of *C. auris* have elevated minimum inhibitory concentrations (MICs) to the three major classes of antifungals, severely limiting treatment options. *C. auris* requires specialized methods for identification and could be misidentified as another yeast when relying on traditional biochemical methods. CDC is aware of one isolate of *C. auris* that was detected in the United States in 2013 as part of ongoing surveillance. Experience outside the United States suggests that *C. auris* has high potential to cause outbreaks in healthcare facilities. Given the occurrence of *C. auris* in nine countries on four continents since 2009, CDC is alerting U.S. healthcare facilities to be on the lookout for *C. auris* in patients.

Background

Candida auris is an emerging multidrug-resistant (MDR) yeast that can cause invasive infections and is associated with high mortality. It was first described in 2009 after being isolated from external ear discharge of a patient in Japan [1]. Since the 2009 report, *C. auris* infections, specifically fungemia, have been reported from South Korea [2], India [3], South Africa [4], and Kuwait [5]. Although published reports are not available, *C. auris* has also been identified in Colombia, Venezuela, Pakistan, and the United Kingdom.

It is unknown why *C. auris* has recently emerged in so many different locations. Molecular typing of strains performed by CDC suggests isolates are highly

C. auris in the U.S.

State	Cases
Illinois	2
Maryland	1
New Jersey	1
New York	15

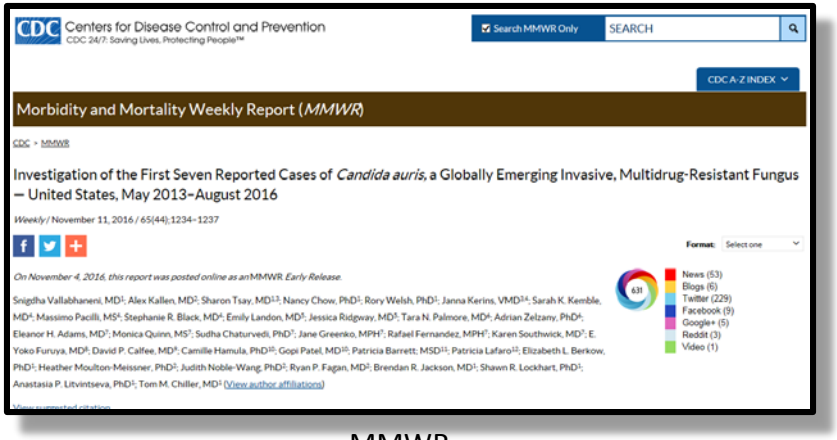
C. auris in the U.S.

State	Cases
Illinois	2
Maryland	1
New Jersey	1
New York	23

- More cases in New York, or better detection of cases in New York?
- In addition to the cases listed above for New York, at least 4 persons have positive surveillance cultures, likely more to come
- In the US, most isolates resistant to fluconazole, some resistant to amphotericin B, no echinocandin resistance (yet)

MMWR November 11, 2016

- Seven cases in US reported as of August 2016
  - 6 identified via retrospective review of laboratory records
  - Recent travel for only one case (2013 New York case)
- All 7 patients had serious medical conditions
- Patients colonized for weeks-months after infection
- Possible hospital transmission
  - Median of 18 days from admission to *C. auris* isolation
  - Epidemiology and whole genome sequencing
- Positive environmental cultures
  - Negative after terminal cleaning with bleach solution and UV light



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Infection Control

- Applies to both infected and colonized patients
- Acute care
  - Standard and Contact Precautions
  - Single room

Infection Control

- Long term care
  - Single room when available
  - Standard and Contact Precautions
    - May modify if low-risk patient (high functioning, no wounds or indwelling devices)
    - Still use gowns/gloves for high-risk tasks
  - Residents not restricted to room
    - Hand hygiene
    - Clean and disinfect shared items

Infection Control

- Persistent colonization
  - Consider axilla and groin cultures every 1-3 months
  - Need at least 2 rounds of negative surveillance cultures (not on antifungals) at least 1 week apart before a person can be considered “cleared”
  - Remain under Standard and Contact Precautions indefinitely unless clearance documented
  - No data and no recommendations for decolonization

Infection Control

- Very important to notify receiving facility upon transfer
- Persistence in healthcare environments
  - Thorough daily and terminal cleaning and disinfection of patient rooms using EPA-registered hospital grade disinfectant with a fungal claim

Infection Control

- Additional measures in consultation with public health
  - Contact tracing with screening cultures
  - Point prevalence surveys of affected units
  - Other measures depending on the situation

Goals

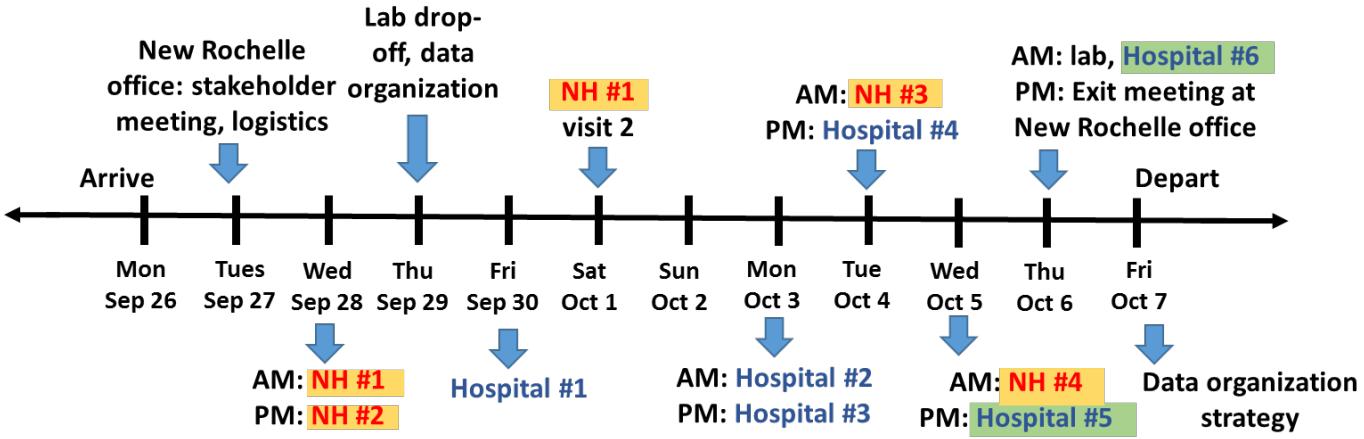
- Prevent transmission and further spread in affected facilities
- Define the extent of the problem
- Delay and blunt the impact of this organism in New York and the US

New York Alerts

- 8/17/2016 – “Global Emergence of Invasive Infections Caused by the Multidrug-Resistant Yeast *Candida auris*”
- 11/3/2016 – “Identification and Reporting of Suspected *Candida auris* Isolates”

CDC Epi-Aid, Sept 26-Oct 7

- Atlanta EIS officer, NYCDOHMH EIS officer, one other CDC epidemiologist, NYSDOH personnel



Nursing home
Hospital
Sampling performed by Epi-Aid team
Sampling performed by facility

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CDC Epi-Aid, Sept 26-Oct 7

- Site visits
  - Surveillance cultures
  - Infection control recommendations
- Review of records to identify possibly-affected facilities
- Modelling of connectivity (admissions and discharges) of affected facilities to other facilities throughout the region
- Development of short case report form
- Coordination of laboratory activities

Second CDC Epi-Aid, Dec 14-23

- Site visits to high risk facilities with cases
  - Surveillance cultures/PPS
  - Infection control recommendations
- Extensive infection control education

CDC Recommendations for NYSDOH and Facilities

- For facilities where a patient/resident with *C. auris* resides or is admitted, or has recently resided or been admitted:
  - Complete case form for all new cases
  - Site visit to assess adherence to infection control recommendations
  - Screening cultures of roommates
  - Screening of rooms occupied by known cases after discharge/terminal cleaning to document clearance of the organism from the environment
  - Point prevalence survey (PPS) of affected areas in the facility
    - Facilities where cases are currently located or spent ≥7 days recently
    - Broaden if colonization or infection discovered on PPS
  - Ensure laboratories servicing affected facilities are performing prospective surveillance

CDC Recommendations for NYSDOH and Facilities

- Periodic re-screening of cases to document clearance
- Ongoing prospective lab surveillance
- Consider PPS at facilities of patients overlapping at least 3 days with case patient
- Region-wide PPS of involved and/or highly-connected post-acute care facilities
- Admission screening possibilities
  - Patients transferred from affected facilities
  - At highly-connected acute care hospitals
    - Patients with history of healthcare in affected countries within past year
    - Patients with admission to LTACH or LTCF within past year
  - Consider for all patients hospitalized in affected countries within past year

Plans

- Follow CDC recommendations to the extent feasible
  - 3-4 staff members
- Continue activities surrounding newly identified cases
- Expand PPS to other institutions in the metropolitan area
- Consider admission screening

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