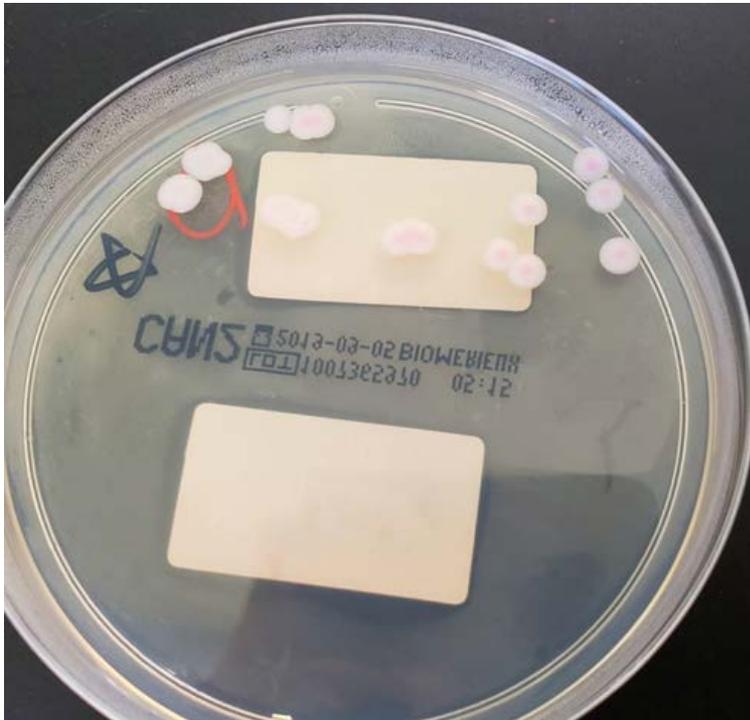


C auris

The first case in Hong Kong

PMH Experiences



ID Forum
Dr W K To, PMH ICO
12 August 2019

The first case detected in PMH:

- 48/M, Banker. Travel Hx to Switzerland
- Admit directly to ICU (after land) due to Pulmonary embolism on 19/5/2019
- Transfer to a medical ward **F** on 31/5/19
- Has been on multiple antibiotics: *Rocephin, Sulperazon, Cloxacillin, Tazocin, Augemntin, Levofloxacin, Meropenem, Vancomycin and Fortum*
- **ETA 14/6 fungal culture : Candida auris (confirmed by phlc on 24June19)**
- 24/6: Pooled swab: Heavy growth of *C auris*
- *C auris* was considered as colonizer and no antifungal was given

Contact tracing

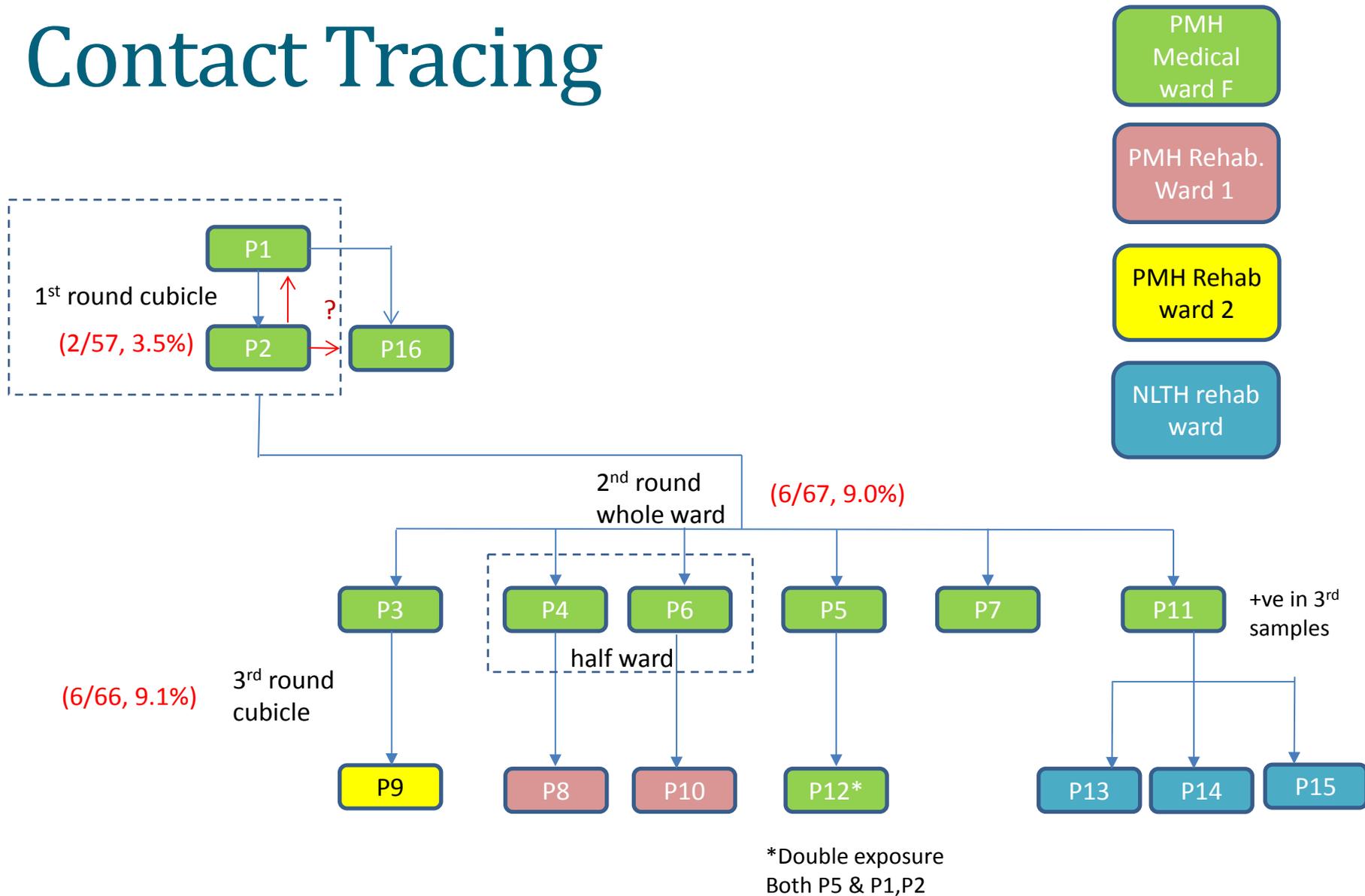


?Transmit

Case 2:

- 59/M US resident.
- Pre-existing Coronary Artery Disease with CABG done, but unknown place and time
- **Transit** in HK airport (from Manila to USA)
- Admit directly to ICU on 8/5 with diagnosis of Acute coronary syndrome, post cardiac arrest
- Transferred to a medical ward on 11/5
- Further transferred to medical ward **F** on 6/6
- No antibiotic after 27/5
- Microbiology results (Pooled swab)
 - 24/6 : No growth
 - 25/6 : 1 colony of *C. auris*
 - 26/6 : no *C. auris*
 - 28/6 : 1 colony of *C. auris*
 - 29/6 : Few colonies of *C. auris*

Contact Tracing



Medical Ward F



Entrance

Linen Room

Sluice Room

P5: Bed 25->26->other ward-> 13 ->5 ⁵

WGS

- The seven local isolates were in the same clade as those from India and Pakistan (South Asian clade)
- They were closely related to one another, differing by ≤ 12 SNPs
- They are different from the rest of the isolates in this clade by >40 single nucleotide polymorphisms (SNPs).

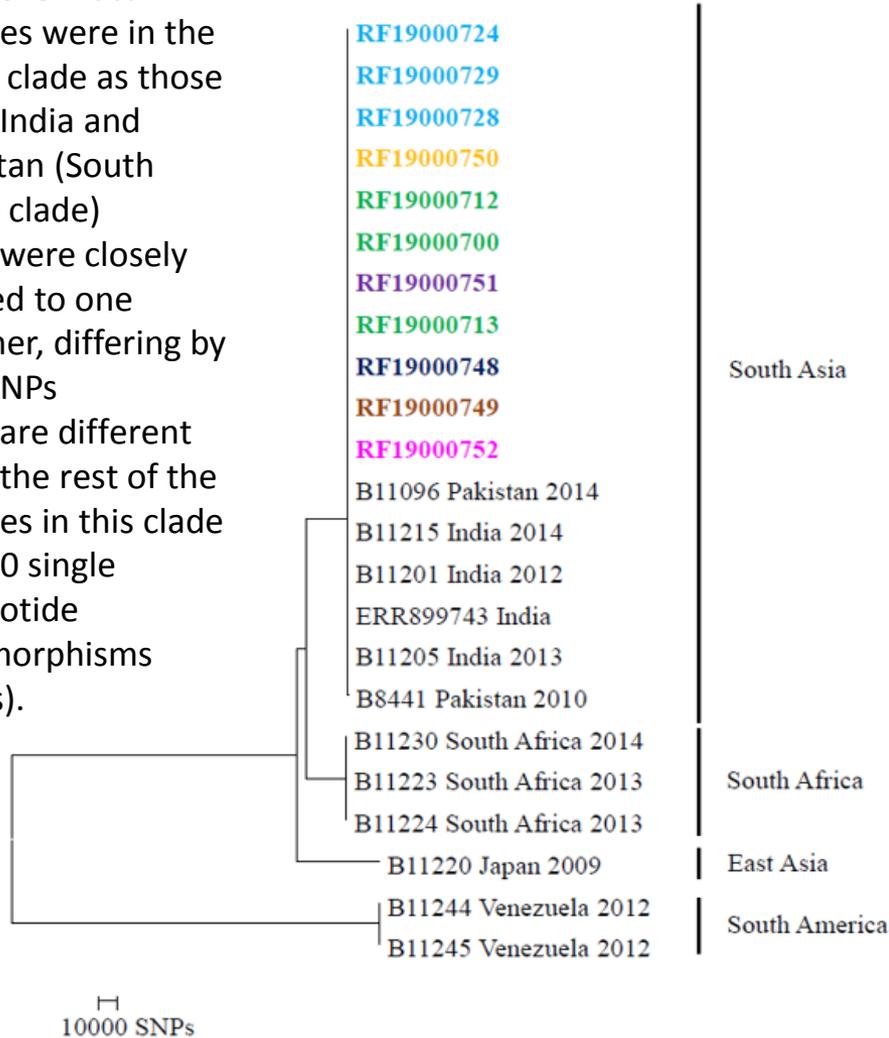
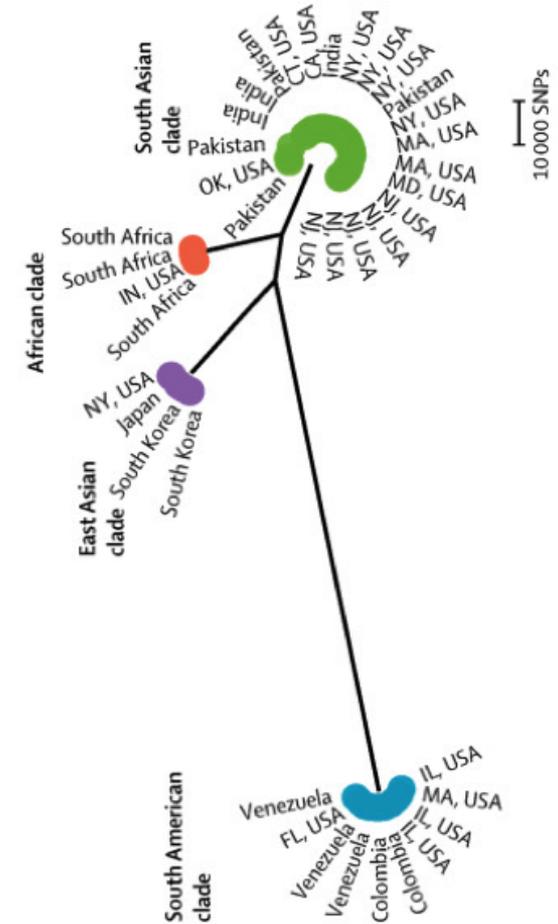


Fig 1a. Phylogenetic tree showing the genetic relationships among isolates comprising 4 distinct clades. The isolates from the seven patients were indicated by different colors.

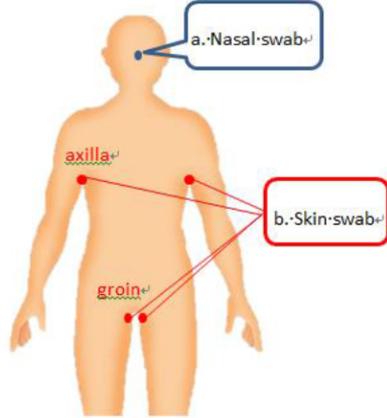
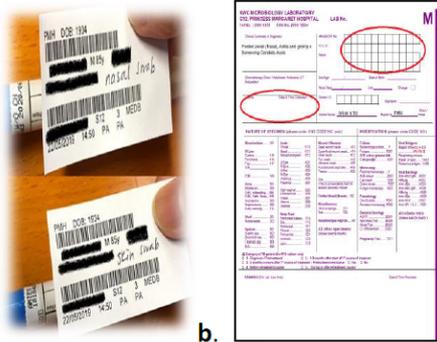


Distribution of *Candida auris* clades in the United States.

Procedure for collecting swabs for *Candida Auris*

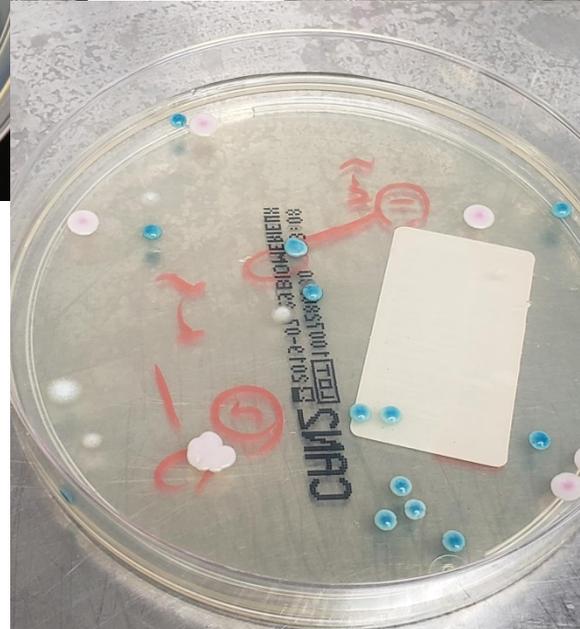
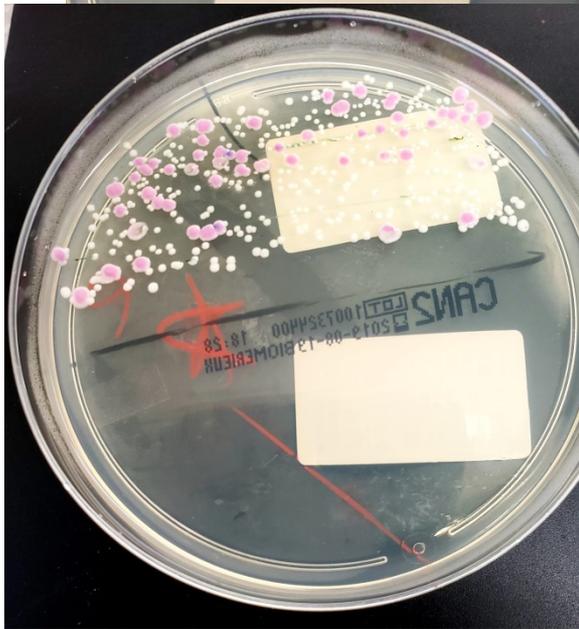
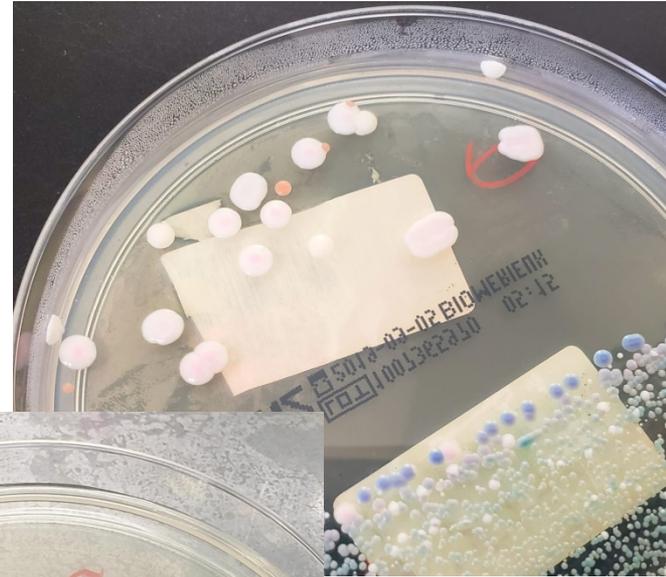
Surveillance culture of Contacts

- According to HA guidelines
- 3 sets of pooled nasal, axilla and groin swab, at least daily apart
- 2 swabs taken: Nasal & Axilla + Groin

 <p>Top left: Hand sanitizer bottles. Top right: Yellow protective gown. Bottom: White gloves.</p>	 <p>A hand holds a swab with a red arrow pointing to the tip being moistened.</p>
<p>1. Perform hand hygiene and wear appropriate PPE.</p>	<p>2. Ensure the swab tip is moistened before taking specimen.</p>
 <p>Diagram of a human body with labels: 'a. Nasal swab' (pointing to nostrils), 'axilla' (pointing to armpits), 'groin' (pointing to groin area), and 'b. Skin swab' (pointing to both armpits and groin).</p>	 <p>Left (a): Swabs with labels 'nasal swab' and 'skin swab'. Right (b): Lab form with 'nasal swab' and 'skin swab' circled, and a date/time field circled.</p>
<p>3. a) Take swab from both nostrils. b) Use another swab, obtain skin swab from both sides of axilla and groin region</p>	<p>4. a) Indicate "nasal swab" and "skin swab" on the specimen b) Indicate collection date and time using one lab form</p>

Laboratory Protocol:

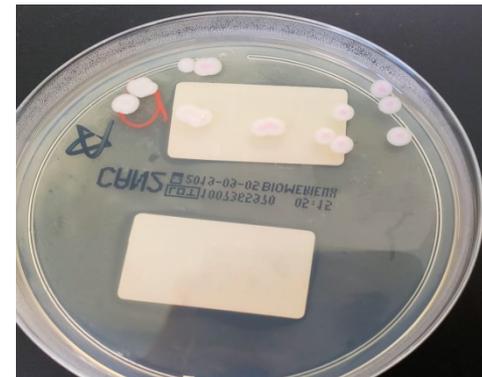
Culture: Solid Medium: ChromID CAN2 (bioMerieux)



- White/pink colony
- Typical white colony with pink center

Culture:

- ChromID CAN2 incubated at 35°C according to package insert.
- Chrom ID:
 - All positive isolates were detected in either day 2 or day 3.
 - Prolonged incubation up to 7 days on 400+ cases, no additional isolates were detected.



Broth: Sabouraud dextrose salt antibiotic broth (10%NaCl+Antibiotics)

- Incubated at 40°C according to reference
- Inhibit the growth of various *Candida species* and bacteria, except *C. glabrata*.
- Bacteriostatic to *Candida species*.
- Help to reduce screening workload.
- All *C. auris* growth well at 40°C
- *C. auris* require 48 hours to growth turbid.
- 2 known cases: No growth on Chrom ID after 7 days incubation but Sab dex salt Ab Broth became turbid on Day 5 and Day 6.



ID: MALDITOF

- Direct transfer method or extended direct transfer method is not good with Consistency B or C and score < 2.0 (MSP 7171).
- Only **Full extraction** method illustrate good result: Consistency A and score > 2.0 (MSP 7171).
- Better performance on new software version MSP 7712 (Database N=9 CAUR).

Vitek Yeast card (Software V07.01)

Princess Margaret Hospital
 Laboratory Report
 bioMerieux Customer:
 System #: VITEK 2 XL
 Printed Jun 21, 2019 08:05 CST
 Autoprint

Plate Group: 19MB255369-1
 Card Type: YST Testing Instrument: 0000148FF95F (Serial No. 3254)

Lot Number: 6110145245321771
 Organism Quantity:

Comments:

Identification Information	Card:	YST	Lot Number:	2430965203	Expires:	Jul 18 2020 12:00 CST
	Completed:	Jun 21, 2019 08:26 CST	Status:	Final	Analysis Time:	18.25 hours
Selected Organism	98% Probability	Candida haemulonii			Confidence:	Excellent identification
SRF Organism	Bionenumber: 6110145245321771					
Analysis Organisms and Tests to Separate:						
Analysis Messages:						
Contraindicating Typical Biopattern(s)						

3	LysA	-	4	IMLTa	+	5	LeuA	+	7	ARG	+	10	ERYa	-	12	GLYLa	-
13	TyrA	+	14	BNAG	-	15	ARBa	-	18	AMYa	-	19	dGALa	-	20	GENa	-
21	dGLUa	+	23	LACa	-	24	MAdGa	-	26	dCELa	-	27	GGT	-	28	dMALa	+
29	dRAFa	+	30	NAGA1	-	32	dMNEa	+	33	dMELa	-	34	dMLZa	+	38	ISBEa	-
39	IRHAa	-	40	XLTa	-	42	dSORa	+	44	SACa	+	45	URE	-	46	AGLU	+
47	dTURa	+	48	dTREa	+	49	NO3a	-	51	IARAA	-	52	dGATa	+	53	ESC	-
54	IGLTa	+	55	dXYLa	-	56	LATa	-	58	ACEa	+	59	CITa	+	60	GRTas	+
61	IPROa	+	62	2KGa	+	63	NAGa	+	64	dGNTa	+						

Installed VITEK 2 Systems Version: 07.01
 MIC Interpretation Guideline:
 AES Parameter Set Name:

Therapeutic Interpretation Guideline:
 AES Parameter Last Modified:

Vitek Yeast card (Software V08.01)

bioMérieux Customer:
System #:

Laboratory Report

Printed Jun 26, 2019 12:41 CST
Printed by: jackchong

Isolate: RF19000700-1 (Approved)

Card Type: YST Bar Code: 2430834403336771 Testing Instrument: 000014EEECFA (Serial No. 3356)
Setup Technologist: Penny Wong(mywong1)

Bionumber: 4110145245321771

Organism Quantity: Selected Organism: **Candida auris**

Comments:	

Identification Information	Card:	YST	Lot Number:	2430834403	Expires:	Mar 9, 2020 12:00 CST
	Completed:	Jun 26, 2019 09:11 CST	Status:	Final	Analysis Time:	17.83 hours
Organism Origin	VITEK 2					
Selected Organism	99% Probability Candida auris					Confidence: Excellent identification
	Bionumber: 4110145245321771					
SRF Organism						
Analysis Organisms and Tests to Separate:						
Analysis Messages:						
Contraindicating Typical Biopattern(s)						

Biochemical Details																	
3	LysA	-	4	IMLTa	-	5	LeuA	+	7	ARG	+	10	ERYa	-	12	GLYLa	-
13	TyrA	+	14	BNAG	-	15	ARBa	-	18	AMYa	-	19	dGALa	-	20	GENa	-
21	dGLUa	+	23	LACa	-	24	MAdGa	-	26	dCELa	-	27	GGT	-	28	dMALa	+
29	dRAFa	+	30	NAGA1	-	32	dMNEa	+	33	dMELa	-	34	dMLZa	+	38	ISBEa	-
39	IRHAa	-	40	XLTa	-	42	dSORa	+	44	SACa	+	45	URE	-	46	AGLU	+
47	dTURa	+	48	dTREa	+	49	NO3a	-	51	IARaA	(-)	52	dGATa	+	53	ESC	-
54	IGLTa	+	55	dXYLa	-	56	LATa	-	58	ACEa	+	59	CITa	+	60	GRTas	+
61	IPROa	+	62	2KGa	+	63	NAGa	+	64	dGNTa	+						

Sensitivity

PMH Vitek AST card						E test by PMH	
Fluconazole	Voriconazole	Flucytosine	Amphotericin B	Caspofungin	Micafungin	Fluconazole	Voriconazole
16ug/ml	<=0.12ug/ml	<=1 ug/ml	2 ug/ml	0.25 ug/ml	0.12 ug/ml	>=256ug/ml	0.75ug/ml
CDC Tentative MIC breakpoint (ug/mL) ≥32	N/A	N/A	CDC Tentative MIC breakpoint (ug/mL) ≥2	CDC Tentative MIC breakpoint (ug/mL) ≥2	CDC Tentative MIC breakpoint (ug/mL) ≥4		

<https://www.cdc.gov/fungal/candida-auris/c-auris-antifungal.html>

Multi-resistant, Candin is probably the drug of choice if treatment is indicated

Patient screening

Specimen types

Pooled swab(Nasal, Axilla and Groin)

Reagents, Materials and Media

chromID[®] CAN2 agar (Biomerieux)

Sabouraud dextrose broth with 10% NaCl and 50mg/L Chloramphenicol and Colistin (20mg/L).

Samples Processing and Examination

Day 0 Put up

- Inoculate pooled Nasal swab and combined axilla and groin swab onto the same half plate (i.e. chromID CAN2) using the same laboratory number.
- Incubate the plate at ambient air at $35 \pm 2^{\circ}\text{C}$.for 4 days.
- Check the plate daily.
- Perform MALDITOF identification with full extraction for any suspected colonies (white and pink colonies, EXCLUDE blue colonies)
- After that, inoculate the same nasal swab and Axilla and groin swab into the Sabouraud dextrose broth with 10% NaCl and 50mg/L Chloramphenicol and 20mg/L Colistin. Incubate the broth at ambient air at $40 \pm 2^{\circ}\text{C}$.for 7 days.
- Check the broth daily for any turbidity.

Environmental screening

1. Specimen type

- Environment Sponge in a leak proof container

2. Reagents, Materials and Media

- Sabouraud dextrose broth (oxoid CM0147) with 10% NaCl and chloramphenicol (50mg/L) and colistin (20mg/L).

3. Specimen processing and examination

- Add 20 mL sabouraud dextrose salt antibiotic broth into the container.
- Mixing the broth content thoroughly with slow circular motion then incubated at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 7 days.
- Inspect the broth daily for signs of growth or turbidity for up to 7 days.
- Slowly and gently invert every day, making certain paddle surfaces are coated with broth.
- If the broth is turbid, subculture onto ChromID CAN2 agar (half plate), incubated at $35^{\circ}\text{C} \pm 2$ for 3 days.
- Perform MALDITOF identification with full extraction for any suspected colonies.

Types and Number of Samples Summary

Case no	Nasal	Axilla/groin	Combine	Urine	Rectal	1 st positive screening sample
1			Positive	Positive	Positive	Clinical specimen
2	Positive	Positive	Positive	NA	NA	2nd
3	Negative	Positive		Negative	Negative	1st
4	Negative	Positive		NA	NA	1st
5	Negative	Positive		Positive	Positive	2nd
6	Negative	Positive		Negative	Negative	1st
7	Negative	Positive		Positive	Positive	2nd
8	Negative	Positive		Negative	Negative	1st
9	Positive	Positive	Positive	Negative	Negative	1st
10	Positive	Positive	Positive	Negative	Negative	1st
11	Negative	Positive		NA	NA	3rd
12			Positive	NA	NA	6 th (2 Exposure)
13			Positive	Negative	Negative	1st
14			Positive	Positive	Negative	1st

Outbreak Management

1. All confirmed cases of inpatients are having room isolation with strict contact precautions.
2. With the help of ICB, CHP, known positive cases can be discharged to OAH after assessment and education.
3. Contact tracing (ward / cubicle) and environmental sampling
4. Enhanced infection control measures in the affected wards:
 - terminal disinfection of wards and equipment
 - environmental disinfection at least twice daily
 - daily change of bedside curtains
 - reinforcement of hand hygiene
 - infection control patrol by infection control nurses
 - patient education
5. HOCT meeting was held on 5 July
 - ICB of CHP has suggested to continue the current control measures

Conclusion:

PMH's experiences have demonstrated the reasons why we are concerned about *C. auris* infections.

1. It is often resistant to multiple antifungal drugs commonly used to treat *Candida* infections.
 - In US, about 90% of *C. auris* isolates have been resistant to fluconazole, about 30% have been resistant to amphotericin B, and less than 5% have been resistant to echinocandins.
2. It is difficult to identify with standard laboratory methods.
3. It can transmit to patients on the hands of healthcare workers, persists in the environment, and can colonize people who then serve as a reservoir for outbreaks.
 - *C. auris* outbreak in a neonatal unit in Venezuela (2012)
 - *C. auris* outbreak with 372 colonization and 85 bloodstream infections in a 992-bed tertiary institution in Valencia, Spain (2016-2017)
 - *C. auris* outbreak with 72 cases in an ICU of the Royal Brompton Hospital in London; the ICU was closed for 11 days (2016)