

Antimicrobial Stewardship and HAI Prevention: Insights from COVID-19

February 25, 2021



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Agenda

(15 min) Summary Review: Antimicrobial Use and Hospital Acquired Infections (HAIs) in COVID

(30 min) Roundtable Discussion

(15 min) Questions

COVID Pandemic: Current State of Play

- The COVID-19 pandemic has accounted for over **90 million cases worldwide** and **more than 400,000 deaths in the US**.
- Hospitalized COVID patients deal with more than just COVID
 - co-infection
 - MDRO (multidrug resistance)
 - ? mortality, readmission

Candida auris: Killer fungus spreading rapidly in coronavirus wards in US

WION Web Team

Washington, United States • Published: Jan 09, 2021, 11:04 AM (IST)



<https://pandemic.internationalso.com/2019-ncov/ncov-education-and-communication>
<https://coronavirus.jhu.edu/map.html>

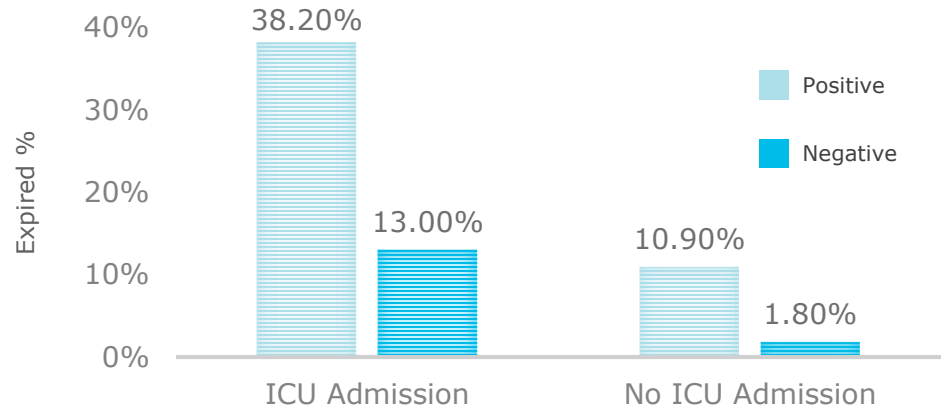
REF-20421, Prestel C, Anderson E, et al. Candida auris Outbreak in a COVID-19 Specialty Care Unit - Florida, July -August 2020, CDC Morbidity and Mortality Weekly Report, 2020.

Why Should we Still Care About COVID?

COVID testing status and hospital care:

- COVID+ patients (vs COVID -) have*:
 - Higher mortality (both ICU and non-ICU areas)
 - Longer length of stay
 - Higher rate % needing ICU care

	Admit	Col. %	ER Admit	AVG. LOS	ICU Admits	Avg. ICU LOS
Negative	131,123	87.0%	47.6%	5.4	17.5%	3.9
Positive	19,675	13.0%	57.0%	9.3	24.3%	8.1
Grand Total	150,798	100.0%	48.8%	5.9	18.4%	4.7



*Source: BD insights Research & Analytics, <https://www.bd.com/en-us/clinical-excellence/covid-19-insights-analytics>

* REF-20422, Musmar, J, Meeting Summary, PACCARB, Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria, 2020.

* REF-20423, Price-Haywood E, Burton J, Fort D, Seoane L, Hospitalization and Mortality among Black Patients and White Patients with COVID-19, NEJM, 2020.

Hospitals are Using Resources in COVID

Characteristic	Not tested for SARS-CoV-2 (n=457,655)	Tested for SARS-CoV-2	
		SARS-CoV-2 positive (n=17,075)	SARS-CoV-2 negative (n=124,979)
Demographics			
Male sex, n (%)	201,145 (44%)	9,053 (53%)	58,114 (46%)
Age, mean (SD) [median] years	48.5 (27.5) [54]	61.7 (18.0) [63]	58.5 (20.9) [62]
ICU Admissions: n (%)	47,405 (10.4%)	4,034 (24%)	20,969 (17%)
Specimens collected for other pathogens, n (%)	189,564 (41.4%)	16,706 (97.2%)	114,899 (91.9%)
Specimens positive for other pathogens, n (% of admissions with specimens collected)	53,114 (28.0%)	3,487 (20.9%)	24,539 (21.4%)

- Culturing practices differed based on SARS-CoV-2 status and tested or not.
 - SARS-CoV2 + were also cultured for other pathogens at **97%**
 - SARS-CoV2 – were also cultured at **92%** (COVID -) rate
 - No SARS-CoV2 test: **41%** culture rate

Culture Results: Possible Co-Infections

*Respiratory + cultures:

- COVID+ patients - 24%
- COVID - 15%
- No SARSCoV2 test - 14%

*ALL groups: Gram neg rods 45%

*Pseudomonas and Candida higher in COVID

*Co-infection in COVID patients with another respiratory virus 2.2%

*COVID patients had more cultures done later in the hospitalization

Source and pathogen distribution by SARS-CoV-2 testing status

Specimen Onset, Source, and Pathogens	Not tested for SARS-CoV-2 (n=457,655)	Tested for SARS-CoV-2	
		SARS-CoV-2 positive (n=17,075)	SARS-CoV-2 negative (n=124,979)
Any positive specimen	77,625	5,571	40,742
Specimen onset			
Admission period	61,990 (79.9%)	3,119 (56.0%)	31,534 (77.4%)
Hospital-onset period	15,635 (20.1%)	2,452 (44.0%)	9,208 (22.6%)
Specimen source, n (% positive specimens)			
Urine	22,026 (28.4%)	1,754 (31.5%)	10,409 (25.5%)
Respiratory	10,775 (13.9%)	1,324 (23.8%)	5,949 (14.6%)
Blood	12,306 (15.9%)	1,181 (21.2%)	10,287 (25.2%)
Other	16,804 (21.6%)	1,015 (18.2%)	7,721 (19.0%)
Skin/Wound	14,416 (18.6%)	275 (4.9%)	5,819 (14.3%)
Intra-abdominal	1,318 (1.7%)	22 (0.2%)	557 (1.4%)
Specimen pathogens, n (% total pathogens)			
Total pathogens	91,219	6,057	48,051
Any bacteria	71,496 (78.4%)	4,871 (80.4%)	38,932 (81.0%)
Gram-negative	40,670 (44.6%)	2,791 (46.1%)	21,719 (45.2%)
Enterobacterales	26,462 (29.0%)	1,860 (30.7%)	14,128 (29.4%)
Pseudomonas aeruginosa	3,950 (4.3%)	410 (6.8%)	2,481 (5.2%)
Acinetobacter baumannii	279 (0.3%)	27 (0.4%)	162 (0.3%)
Gram-positive	30,826 (33.8%)	2,080 (34.3%)	17,213 (35.8%)
Staphylococcus aureus	11,247 (12.3%)	746 (12.3%)	6,710 (14.0%)
Enterococcus spp.	6,950 (7.6%)	575 (9.5%)	4,024 (8.3%)
Streptococcus pneumoniae	725 (0.8%)	99 (1.6%)	546 (1.1%)
Non-SARS-CoV-2 virus	14,327 (15.7%)	599 (9.9%)	5,908 (12.3%)
Respiratory viruses*	5,333 (5.8%)	136 (2.2%)	1,395 (2.9%)
Fungi	4,210 (4.6%)	483 (8.0%)	2,445 (5.1%)
Candida spp.	1,963 (2.2%)	365 (6.0%)	1,657 (3.4%)
Aspergillus spp.	122 (0.1%)	6 (0.1%)	121 (0.3%)

A Clinician View

*Hopkins

- Used clinical teams to determine whether cultures were clinically relevant
- 1016 hospitalized patients 3/1/2020 – 5/31/2020 (5 hospitals) for the first 7 days (Also used chart review of progress notes and xrays/radiology reports)
- Findings:
 - Bacterial respiratory co-pathogen with SARS-CoV-2 was 1.2%
 - Most patients (69%) still received antibiotics for pneumonia
 - Most common non-respiratory clinical infection was UTI (3%)
- Conclusions: “Using multidisciplinary consensus definitions, proven or probable...
 - *bCAP was uncommon in adults hospitalized due to COVID-19, as were other nonrespiratory bacterial infections.*
 - *Empiric antibiotic use was high,*
 - *highlighting the need to enhance antibiotic stewardship in the treatment of viral pneumonias.”*

Open Forum Infectious Diseases

MAJOR ARTICLE

 IDSA
Infectious Diseases Society of America

 hivma
hiv medicine association

Prevalence of Co-infection at the Time of Hospital Admission in COVID-19 Patients, A Multicenter Study

Sara M. Karaba,^{1,2} George Jones,¹ Taylor Helsel,² L. Leigh Smith,¹ Robin Avery,¹ Kathryn Dzintars,^{3,4} Alejandra B. Salinas,¹ Sara C. Keller,^{1,2} Jennifer L. Townsend,^{3,5} Eili Klein,⁶ Joe Amoah,⁷ Brian T. Garibaldi,^{4,5} Sara E. Cosgrove,^{1,2} and Valeria Fabre^{1,3}

The Need for ASP: Antimicrobial Stewardship Programs

- Antimicrobial use:
 - COVID + patients 68% } **21% Culture+**
 - COVID - patients 46% }
 - Vaugh et.al: 27-84% early antibiotic use*
- Antibiotics of note :
 - Extended spectrum 3rd/4th generation cephalosporins
 - Macrolides
 - Beta-lactams/inhibitors
 - Vancomycin
 - Fluroquinolones; Carbapenems

	Non-SARS-CoV-2 tested admissions (n=457,655)	SARS-CoV-2 positive (n=17,075)	SARS-CoV-2 negative (n=124,979)
Admissions Prescribed Antimicrobials (duration ≥ 24 hours; n (%))	118,453 (25.9%)	11,681 (68%)	56,809 (46%)
Admission to Abx Start (mean (SD); median hours)	25.7 ± 157.6 (1)	9.2 ± 51.9 (0)	9.9 ± 50.8 (0)
Duration of Abx (mean (SD); median days)	4.1 ± 3.9 (3)	6.0 ± 5.2 (4.7)	5.0 ± 4.7 (3.5)
Most Common Antimicrobial Classes Prescribed as a % of Discharges Prescribed an Abx			
3rd/4th Gen Cephalosporins	57,136 (48.2%)	8,643 (74%)	33,750 (59%)
Glycopeptides	34,971 (29.5%)	3,630 (31%)	21,719 (38%)
Macrolides	21,638 (18.3%)	8,036 (69%)	16,264 (29%)
β-lactam/β-lactamase inhibitors	35,861 (30.3%)	3,175 (27%)	19,073 (34%)
Fluoroquinolones	18,335 (15.5%)	1,277 (11%)	9,689 (17%)
1st/2nd Gen Cephalosporins	20,128 (17.0%)	560 (5%)	8,705 (15%)
Tetracyclines	7,968 (6.7%)	2,386 (20%)	6,386 (11%)
Carbapenems	8,230 (6.9%)	1,083 (9%)	5,025 (9%)
Antifungals	7,577 (6.4%)	658 (6%)	4,229 (7%)
Anti-influenza agents	3,459 (2.9%)	933 (8%)	998 (2%)

REF-20477, Pusniak L, Finelli I, Bauer K, Moise P, Yu K, De Anda C, et al. Incidence of Infections and Antimicrobial Usage among US Hospitalized Patients with and without COVID-19, ECCVID, MSD Poster, 2020.

REF-20425, Vaughn V, Gahdhi T, Petty L, Patel P, Malani A, et al. Empiric antibacterial Therapy and Community-onset Bacterial Coinfection in Patients Hospitalized with COVID-19, IDSA, 2020.

Adult and Pediatric Patients

- SARS-CoV-2 PCR+
- AND positive blood or respiratory culture
- N= 152
 - 91 patients (respiratory culture+)
 - 82 patients (blood culture +)
- 5 most common respiratory co-pathogens:
 - *S. aureus* (44%)
 - *P. aeruginosa* (16%)
 - *Klebsiella* spp (10%)
 - *Enterobacter* spp (8%),
 - *E. coli* (4%)

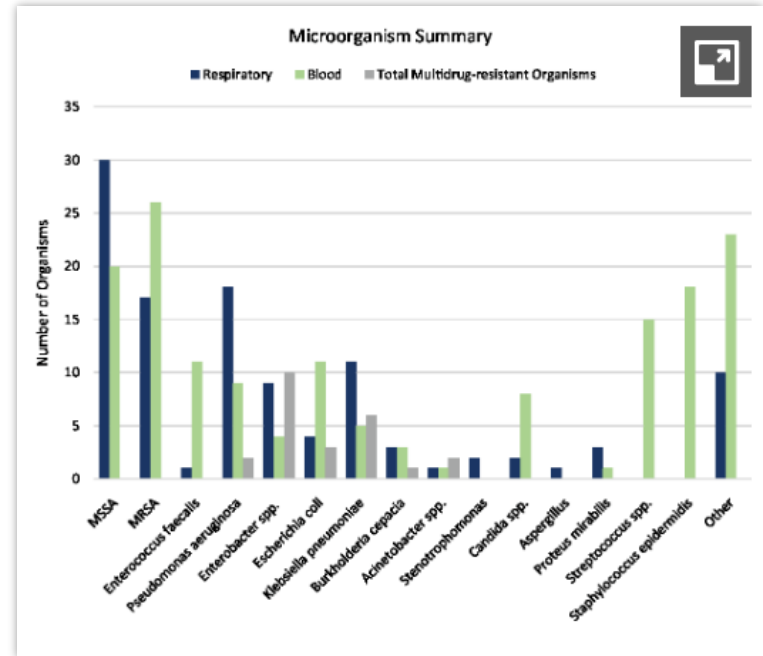
Infection Control & Hospital Epidemiology (2020), 1-5
doi:10.1017/ice.2020.368



Concise Communication

Bacterial and fungal coinfections in COVID-19 patients hospitalized during the New York City pandemic surge

Priya Nori MD¹, Kelsie Cowman MPH¹, Victor Chen PharmD², Rachel Bartash MD¹, Wendy Szymczak PhD³,



COVID Adverse Post-hospital Outcomes

- 60-day outcomes after:
 - 1250 COVID patients discharged
 - 975 (78%) home; 158 (13%) SNF
 - At day 60: **84 had died**
 - 10.4% were in ICU
 - 6.7% were in medical ward
- By 60 days post discharge
 - 189 **(15%) readmitted**



Clinical Summary

Gaps

- Culture positive with COVID-19 infection is about 20%
- Relevant clinical co-infection, may be less (as low as 1-3%)
- Antimicrobial use on COVID patients is at 68% (27 -84%)
- In hospital mortality and post-hospital mortality is significant
- Readmission (15%)

Who will address these gaps?

- ASPs: deal with appropriate and timely antimicrobial use
- Infection Prevention: prevent infection spread and report HAIs

ASP and IP programs Pre COVID-19

- The Joint Commission licensing surveys
 - Infection Prevention support (mandated NHSN HAIs)
 - 2016: started auditing ASPs
- CMS codified as of March 2020:
 - ASPs are required to have certain components
 - Tethered ASPs and Infection Prevention Programs to CoP
- What happens to Antimicrobial Stewardship and Infection Prevention Programs **Post COVID?**



**Eddie Stenehjelm,
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Roundtable **Topic #1**

How has your
ASP been
engaged in
the pandemic
response?



Eddie Stenehjelm,
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What HAI and antimicrobial use patterns have you seen in your institution?

How have “Metrics of success” for ASP changed?

Changes in diagnostic test policy?

Roundtable **Topic #2**

How have
**Infection
Prevention
programs**
interfaced with
ASPs during the
pandemic?



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Do HAI prevention bundles falter during surge capacity situations?

Insights to mitigation of bundle prevention failure?

Collaborations to facilitate safety and HCP welfare

Roundtable **Topic #3**

How can **stewardship programs** help during a pandemic/surge capacity seasons?



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Has the function of ASP teams changed due to the pandemic?

Is there a resource optimization role for ASPs during a pandemic (e.g. antimicrobial stocking, use of diagnostic tests/supplies)?

How can ASP teams proactively protect/identify at risk populations?

Roundtable **Topic #4**

What has the pandemic taught us about **Administrative pain points** during a pandemic and/or flu season preparation?



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“Pull through” learnings for long term enhancement of IPC and ASP teams?



Thank you

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Questions? Email bd.mms@bd.com

