861. Evolution of Antifungal Use Over Fifteen Years in a Burn Intensive Care Unit

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Session: P-39. HAI: Non-Bacterial (Fungal, Viral)

Background. Systemic antifungals (AF) and surgery are the cornerstone of therapy for burn-related fungal infections. Multiple AFs were introduced in the last decade with broader spectrum and improved safety profiles, but use in burn patients has yet to be thoroughly described. Here we evaluate 15 years of AF prescribing patterns in a burn intensive care unit (BICU).

Methods. We included all US Army Institute of Surgical Research BICU patients who received > 1 dose of AF from 2004-18. First we sought to describe overall AF prescribing. Clinical features, mortality and AF use (including in combination) from 2004-8 (T1), 2009-2013 (T2), 2014-18 (T3) were compared.

Results. Between 2004-18, 361 patients with a median total body surface area (TBSA) of 45% (IQR: 25-60) received AF. Median duration of hospital stay prior to and duration of initial AF (AF1) were 13.5 (IQR: 7-22) and 4 days (IQR: 2-9), respectively. Patients prescribed AF had a median of 2 (IQR 1-3) different AFs. AF1 was most commonly fluconazole [FLC; n=141 (39%)], amphotericin [AMB; n=62 (17%)] and voriconazole [VRC; n=55 (15%)]. Of those who survived, (N=233) AF1 was AMB, 40 (17.2%); FLC, 102 (43.8%); itraconazole, 1 (0.4%); VRC, 35 (15%); posaconazole (POS), 6 (2.6%); isavuconazole (ISA), 4 (1.7%); caspofungin (CAS), 7 (3%); micafungin (MFG), 28 (12%), VRC/AMB, 8 (3.4%); FLC/AMB, 0; FLC/CSP, 1 (0.4%); and VCR/MFG 1 (0.4%). AF1 use differed across T1, T2, and T3 (Table). Notably, there was shift towards use of POS, ISA, and MFG. The use of AF1 combination therapy differed across T1, T2, and T3 (p = 0.002). 200 patients had a second AF (AF2) prescribed at a median of 4.15 days (IQR 1.1-12.5) after AF1 for a median duration of 5.3 days (IQR 2-9.7). AF2 were most commonly VRC (n=54, 27%), AMB (n =46, 23%) and FLC (n=44, 22%). There were no differences in AF2 over time.

Table. Clinical characteristics and antifungal use by five year increments

	2004 -2008 N= 122 (%)	2009-2013 N= 128 (%)	2014-2018 N= 111 (%)	p-value
Age, median (IQR)	33 (23-49)	49 (32-65)	43 (31-57)	<0.001
TBSA burn, median (IQR)	52 (33-70)	44 (26-58)	35 (22-51)	0.009
Male gender, no. (%)	104 (85.2)	92 (71.9)	79 (71.2)	0.011
Duration of hospitalization prior to AF, median (IQR)	14 (8-23)	13 (7-23)	13 (7-18)	0.226
ID consulted, no. (%)	93 (76.2)	108 (84.4)	87 (78.4)	0.311
Total length of stay, median (IQR)	64 (37-99)	32 (23-89)	49 (29-75)	0.025
Mortality, no. (%)	23 (18.9)	64 (50.0)	41 (36.9)	0.003
Initial antifungal prescribed, no. (%)				<0.001
Fluconazole	64 (52.5)	42 (32.8)	35 (31.5)	<0.001
Itraconazole	0 (0)	1 (1)	0 (0)	0.354
Voriconazole	25 (21)	20 (15.6)	10 (9)	0.044
Posaconazole	0 (0)	1 (1)	8 (7.2)	<0.001
Isavuconazole	0 (0)	0 (0)	6 (5.4)	<0.001
Caspofungin	9 (7.4)	1 (1)	2 (2)	0.009
Micafungin	0 (0)	10 (7.8)	35 (31.5)	<0.001
Voriconazole/amphotericin	2 (1.6)	19 (14.8)	4 (3.6)	<0.001
Fluconazole/amphotericin	0 (0)	0 (0)	3 (2.7)	0.028
Fluconazole/caspofungin	1 (0.8)	0 (0)	0 (0)	0.337
Voriconazole/micafungin	0 (0)	0 (0)	1 (0.3)	0.307
Use of initial combination antifungal therapy, no (%)	3 (2.4)	19 (14.8)	8 (7.2)	0.002

Conclusion. AF use evolved to include echinocandins and broader spectrum triazoles and decreased use of AMB as part of AF1. However, AF2 remained most commonly VRC, AMB, and FLC.

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862. Impact of Caregiver Health on Pediatric Healthcare-Associated Viral Respiratory Infections (HAVRIs): A Retrospective Study

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Session: P-39. HAI: Non-Bacterial (Fungal, Viral)

Background. The burden of healthcare-associated viral respiratory infections (HAVRIs) in children is significant, with increased healthcare costs and risk of poor outcomes. However, while healthcare workers are the main target of infection prevention measures, little is known about the impact of sick contacts during hospitalization on the incidence of HAVRIs. The objective of our study was to determine the proportion of pediatric HAVRIs following contact with an ill caregiver or visitor. Secondary objectives were to describe the characteristics of affected patients as well as the complications associated with the HAVRI episodes.

Methods. This is a retrospective chart review that took place in a pediatric tertiary care center with both multiple and single-bed rooms. All cases of HAVRIs that occurred between December 2017 and July 2019 in patients aged less than 18 years old were included in the study. HAVRIs were defined as a laboratory confirmed respiratory viral illness occurring after 72 hours of admission.

Results. Forty-four HAVRIs were included in the analysis. The majority (n=32, 72.7%) were among patients aged less than 24 months. Only 2 patients had no comorbidities and almost half (n=21, 47.7%) had multiple complex medical conditions. Rhinovirus was the most frequently isolated virus (n=20, 45.5%). Nine patients (20.5%) had a documented contact with a sick caregiver (n=8, 88.9%) or sick visitor (n=2, 22.2%) in the 7 days prior to the onset of new respiratory symptoms and subsequent HAVRI diagnosis. In the 72 hours prior to HAVRI onset, 18 patients (40.9%) were in a single-bed room and 6 patients (13.6%) were already under droplet/contact precautions. Twelve patients (27.3%) had new or increased O2 requirements and 4 (9.1%) were transferred to the intensive care unit. There were no associated deaths.

Conclusion. Our study suggests that having a contact with a sick caregiver or visitor is a potential risk factor for acquiring a HAVRI. This reinforces the relevance of a strict visitor-screening policy and of educating caregivers on the importance of appropriate hand hygiene when caring for their child. Of note, more than one third of HAVRI cases occurred in patients already in a single-bed room, with or without additional precautions, suggesting that those measures are not entirely protective.

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863. Outcomes of Healthcare-Associated Respiratory Viral Infections in a Pediatric Hospital: A Historical Cohort Study

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Session: P-39. HAI: Non-Bacterial (Fungal, Viral)

Background. Healthcare-associated respiratory viral infections (HARVI) occur frequently at pediatric hospitals. The spectrum and attributable outcomes of these infections are unknown.

Methods. Using a matched historical cohort design, HARVI cases identified between July 2013 and June 2018 at a large pediatric referral hospital in Dallas, Texas were defined as patients who tested positive for one of eight respiratory viruses during their hospitalization, had new respiratory symptoms develop during hospitalization, and had symptom onset on a hospitalization day that was greater than the maximum incubation period for the specific respiratory virus. Controls were matched 1:1 for index time, meaning that the control had a hospital length of stay that was at least as long as the length of stay in the matched case prior to viral testing. Controls were also matched for year and month of infection as well as hospital unit and/or age. The primary outcome was additional length of stay following infection or index time. Additional outcomes included transfer to intensive care, need for intubation, hospital charges, and all cause in-hospital mortality.

Results. Over the 5-year study period, 317 definite HARVI were identified (0.62 per 1,000 admitted patient days), and only 287 (91%) had a matched control to be included in analysis. Among these cases and matched controls, the median time to index time was 19 days (IQR 10-39 days). The most common causative viruses where rhinovirus/enterovirus (188, 65.5%), RSV (30, 10.5%), parainfluenza virus (28, 9.8%), and seasonal coronaviruses (27, 9.4%). Fewer cases than controls were in an intensive care unit at index time (101 [35.2%] vs. 156 [54.4%]) The mean additional length of stay following index time was shorter in cases than controls (35.2 days vs. 48.1 days, difference = -12.9 days, 95% CI -20.95 to -4.82 days).

Conclusion. Hospital length of stay for cases with HARVI was not longer than for those without HARVI. Possible explanations include confounding and selection bias. Further studies with carefully selected controls are needed.

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864. Whole Genome Sequencing is Unable to Track *Candida auris* Transmission

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Session: P-39. HAI: Non-Bacterial (Fungal, Viral)

Background. *Candida auris* (*C. auris*), an emerging yeast species, is often drug-resistant and has caused outbreaks in healthcare settings. Surging *C. auris* cases at our institution prompted whole genome sequencing (WGS) of patient and environmental specimens and comparison to local and international isolates.

Methods. WGS was performed on clinical and environmental isolates obtained from Northwestern Memorial Hospital (NMH) from June 2018 to December 2019. Genome sequences were compared against isolates from other institutions in the Chicagoland area obtained from a reference lab (ACL) and from the CDC. Two isolates underwent long-read sequencing on the Oxford Nanopore GridION platform

to obtain closed genomes. WGS was performed on the remaining isolates with the Illumina MiSeq platform.

Results. Twenty isolates from NMH, five from ACL, and two from the CDC underwent WGS to yield 12.6 Mb genomes. Any two NMH isolates differed from each other by a maximum of 36 single nucleotide variants (SNV) (Figure 1). Two patients thought to be part of a transmission cluster (isolates CA06 and CA07), differed by 7 SNVs. No phylogenetic grouping between hospital systems across Chicagoland was observed. Isolates from room surfaces from a *C. auris* patient differed by 1-6 SNVs from each other and from 7-8 SNVs from the patient isolate. Samples taken from different body sites of another patient differed by 4-9 SNVs. Average SNV counts were lower among nosocomially acquired cases when compared to *C. auris* isolates present on admission (Figure 2). All NMH isolates were fluconazole sensitive, but a fluconazole resistant ACL isolate differed from a sensitive NMH isolate by only 4 SNVs.

Figure 1: Phylogenetic tree of all NMH and ACL isolates with fluconazole sensitivities

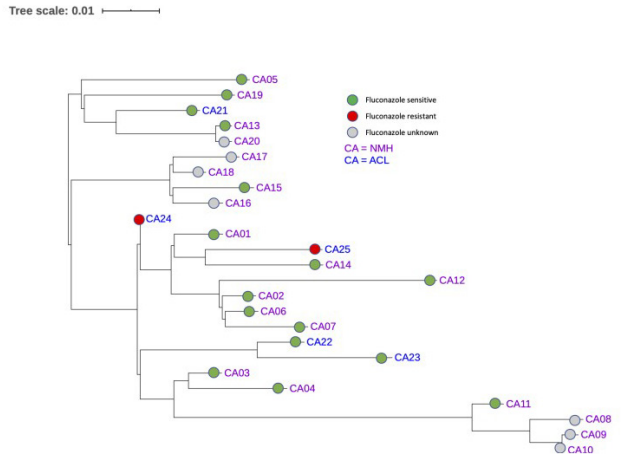
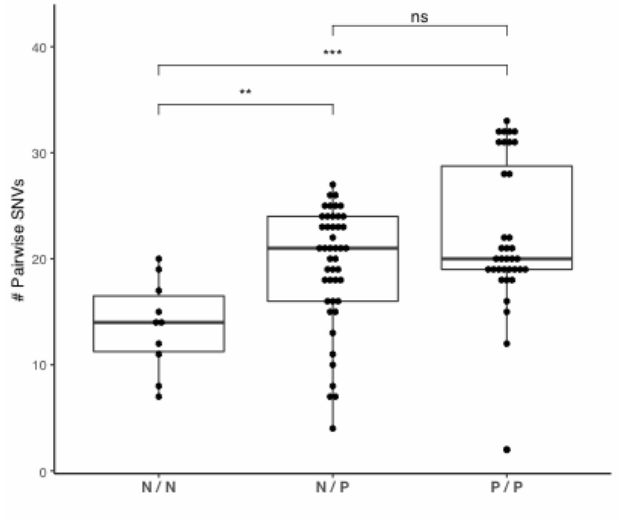


Figure 2: Observed pairwise SNP differences between nosocomial and POA strains



Conclusion. WGS of *C. auris* did not reveal identical isolates in any instance, even from the same patient or the patients and their environment. Generally, lower numbers of SNVs were observed for intra- versus inter-institutional isolates. More work is needed to determine the use, if any, of WGS in outbreak investigations.

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865. Methicillin-resistant *Staphylococcus aureus* (MRSA) prevalence among healthcare workers (HCW) in contact tracings in a Dutch teaching hospital, 2010-2018

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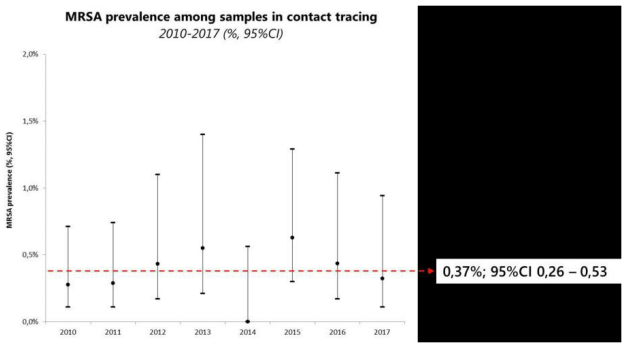
Session: P-40. HAI: Occupational Infection Prevention

Background. In The Netherlands, the national guidelines on MRSA prevention and control advocate screening of HCW after unprotected exposure to MRSA carriers. Although this strategy at large is successful, contact tracing of staff is a time consuming and costly component. We evaluated our contact tracing policy for HCW over the years 2010 – 2018.

MRSA prevalence among samples in contact tracing



Methods. A retrospective, observational study was performed in a Dutch teaching hospital. All HCW who had unprotected contact with an MRSA carrier were included in contact tracing. When there had been a long period of unprotected admission prior to an MRSA finding, or when the index case was a HCW, than the entire (nursing) team was tested. All samples of HCWs who were tested for MRSA carriage as part of contact tracing from 2010 until 2018 were included. A pooled nose, throat and perineum swab was collected using the eSwab medium (Copan) and inoculated on chromID MRSA agar plates (bioMérieux) after enrichment in a broth.

Results. In total, we included 8,849 samples (range: 677 – 1,448 samples per year) from a total of 287 contact tracings (range: 26 – 55 contact tracings per year). Thirty two HCWs were colonized with MRSA (0.36%; 95%CI 0.26 – 0.51). None of them developed a clinical infection.

Eight HCWs (0.10%; 95%CI 0.05% – 0.19%) were colonized with the same MLVA type as the index case, and were detected in 6/287 contact tracings (2%). In 4/8 of these cases, a positive HCW was the index for undertaking contact tracing. In 3/8 cases it was clear that the HCW who was identified in the contact tracing was the source of the outbreak and was the cause of invasive MRSA infections in patients.

Notably, a different MLVA type as the index case was found in 24 HCWs (0,27%; 95%CI 0,18 – 0,40) of which 7/24 HCW (29,2%) were intermittent carriers.

Conclusion. This study revealed a sustained low MRSA prevalence among samples in contact tracing of healthcare workers, over nine years. Furthermore, it shows that when MRSA contact tracing is performed according to the national guideline only 1 out 1000 samples results in a secondary case. This is similar to the population carriage rate of MRSA in The Netherlands. More frequently, an unrelated strain is found. These findings raise question marks regarding the efficacy of the current strategy to perform contact tracing after unprotected exposure.

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866. Assessment of Infection Control Training among Healthcare Workers in Three Tertiary Care Public Hospitals, Bangladesh, 2015-17

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Session: P-40. HAI: Occupational Infection Prevention

Background. Hospital-acquired infections (HAI) are a rising global public health concern that disproportionately affects low and middle-income countries. Healthcare workers (HCWs) are the frontline work-stream against HAIs in healthcare settings. As part of a pilot infection prevention and control (IPC) program, we assessed the acceptability of infection control training in practice among HCWs in three public hospitals in Bangladesh to better mitigate HAI risks and occupational exposures.

Methods. We piloted an IPC intervention, as a part of the emergency preparedness, from 2015 to 2017 and IPC training was one of the key components. Trained IPC staff conducted a half-day training session for each three different level HCW groups, doctors, nurses and support staff. The training comprised of instructive method on standard and transmission-based precautions with infection control techniques. A practical demonstration was held followed by hands-on training on hand hygiene steps and mask, gloves use. The participants' attitudes and practices on infection control measures were obtained through structured observation and qualitative interviews.