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Carbapenem Resistant Organisms (CRO) in Health Care Settings and Antibiotic Stewardship during COVID-19 Surge

- Antibiotic Prescribing, Use, and Resistance

Introduction

The Washoe County Health District (WCHD) reported the first case of COVID-19 on March 5, 2020. As of December 11, 2020, a total of 29,881 cases have been reported (incidence rate of 6,350 cases per 100,000 population). Throughout this pandemic, other conditions of public health concern have not ceased. As COVID-19 prevalence in the community increases, the number of persons cycling through hospital environments subsequently increases, resulting in increased patient counts, length of stay in acute-care hospitals, and antibiotic use.¹ These factors increase risk of healthcare associated infections including multidrug-resistant organisms (MDROs) such as carbapenem resistant organisms (CROs), which are difficult to treat. CROs remain a concern with the increased strain on personal protective equipment (PPE), medical equipment, hospital staff, and modified infection prevention and control (IPC) practices used to preserve continuity of care in acute-care hospitals experiencing ongoing burden as COVID-19 surges in the community.

A compounding issue with healthcare associated CROs and COVID-19 surges is the increased use of antibiotics to treat negative clinical consequences of COVID-19, such as development of bacterial infections like pneumonia. However, antibiotics do not prevent or treat COVID-19 itself.² The overuse of antibiotics promotes the accelerated development of CROs. While antibiotic use nationally is down comparatively to 2019, it is still high in general.¹

Due to continued widespread community transmission of COVID-19 in Washoe County, it is important for acute-care settings to remain vigilant with CRO surveillance and continuity of core IPC practices. In addition, it is important for providers to also review and consider appropriate antibiotic use to prevent overuse of antibiotics.

CRO Surveillance and Data During COVID-19

In a recent MMWR publication, a New Jersey acute-care hospital with approximately 500 beds reported a cluster of 34 hospital-acquired multidrug-resistant Carbapenem-resistant *Acinetobacter baumannii* (CRAB) infection or colonization cases during a surge in COVID-19

hospitalizations.³ Once the COVID-19 surge lessened and relatively normal operations resumed (i.e. return to standard IPC, staffing, and supplies), the reported cases of CRAB returned to baseline numbers. Of importance, 62% (21) of the cases had been admitted to COVID-19 intensive care units. In review, it was surmised the cluster could have been driven by resource challenges which required intentional changes to IPC measures (e.g. extended use of items such as ventilator circuits and suctioning catheters for patients) and “*competing clinical priorities, challenges in personnel availability, and an effort to minimize staff members’ interaction time with patients.*”³

In Washoe County, hospital laboratories are required to report CROs. WCHD investigates persons who have tested positive for carbapenemase-producing organisms (CPO) in order to identify contacts and prevent further spread. These are of public health importance as resistance genes that code for carbapenemases can be exchanged between different gram-negative bacteria and resistance can spread between different bacteria among patients.

As of December 11, 2020, five CPO cases have been identified in 2020 from local acute-care facilities in Washoe County (range of 29-79 years old; average of 63 years old). All five were hospitalized (100%), four (80%) had hospitalization outside the country within the last 6 months, one (20%) had been transferred from a skilled nursing facility due to suspicion of COVID-19 infection, and one (20%) was in home hospice. None were reported to be confirmed COVID-19 cases.* However, there have been 80 CROs reported in 2020, of which five were also co-infected with COVID-19 (i.e. at least 6.25% of CRO cases were co-infected with COVID-19).* Four of these five (80%) co-infected cases were hospitalized for a significant period of time (i.e. at least 7 days) in local acute-care facilities. While reportedly low in Washoe County, there still remains the current threat of CROs occurring in hospitalized patients co-infected with COVID-19. Thus, the need for vigilance in IPC practices, as well as continued CRO screening and surveillance is still necessary and vital during the current COVID-19 surge.

Recommendations for Acute-Care Hospitals

1. **Continued Surveillance:** Surveillance, which is primarily laboratory-based, is of prime importance. Cases of CRO are first identified at local hospital laboratories through antibiotic susceptibility testing (AST). Specimens shown to be resistant to carbapenem drugs should be forwarded to the Nevada State Public Health Laboratory (NSPHL) for further testing. NSPHL performs its own AST, along with the modified carbapenem inactivation method (mCIM) to identify if the organism produces carbapenemase. If the organism is mCIM positive, it indicates it is a carbapenemase-producing organism or CPO. A PCR test will be performed to determine which carbapenemase is produced. Infection or colonization with a second species of CRO or isolation of the same CRO in a new site in the same individual in the same calendar year is counted as a separate case, thus is reportable.

2. **Coordinated Intervention:** Hospitals should continue established screening questions about foreign hospitalization history within the past six months during the hospital admissions process. If the newly admitted patient has a history of hospitalization in a foreign country in the past six months, the patient should be placed into contact precautions, a CPO colonization screening test should be ordered, and a specimen should be collected and tested.

3. **Containment:** Hospitals are recommended to continue CDC's recommended five CRO containment strategies: rapid detection, infection control assessments, colonization screenings, coordination between healthcare facilities, and continued vigilance until spread is controlled.⁴

4. **Vigilance:** While resources are strained amidst the current COVID-19 surge, hospitals should *"prioritize continuity of core IPC practices (e.g., training for and auditing of hand hygiene, PPE use, and environmental cleaning) to the greatest extent possible during surges in hospitalizations and make every effort to return to normal operating procedures as soon as capacity allows."*²

Recommendations for Healthcare Providers

WCHD strongly recommends that healthcare providers (HCPs) in Washoe County take the following actions in terms of combating CROs, such as possible CPOs:⁵

1. Ask if a patient has received medical care somewhere else, including other countries within the past six months.
2. Place patients currently or previously colonized or infected with CPO on Contact Precautions. Whenever possible, dedicate rooms, equipment, and staff to CPO patients.
3. Wear a gown and gloves when caring for patients with CPO.

4. Perform hand hygiene – use alcohol-based hand rub or wash hands with soap and water before and after contact with the patient or their environment.
5. Alert the receiving facility when you transfer a CPO patient, and find out when a patient with CPO transfers into your facility.
6. Make sure labs immediately alert clinical and infection prevention staff when CPO are identified.
7. Discontinue the use of invasive medical devices such as urinary catheters as soon as no longer necessary.
8. Always report CPO cases to WCHD at 775-328-2447 or fax to 775-328-3764.
9. Prescribe and use antibiotics wisely.⁶
 - a. Take the time to make the correct diagnosis before prescribing an antibiotic.
 - b. If a bacterial infection is diagnosed, use the first line antibiotics for that infection.
 - c. Use correct doses – look them up if uncertain.
 - d. Get a detailed drug allergy history.
 - e. Interpret cultures correctly – treat the patient, not the lab result.
 - f. Communicate effectively with the patient, especially when an antibiotic will not be prescribed.

CDC information on Antibiotic Prescribing and Use:
<https://www.cdc.gov/antibiotic-use/index.html>

*Note

Presented COVID-19 data is restricted to only Washoe County residents, while local acute-care facilities do receive and treat residents of other counties as well. Data presented does not reflect residents from outside counties who may be COVID-19 positive but does reflect all CROs reported in Washoe County regardless of residency.

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¹ Srinivasan, A. (2020). The Intersection of Antibiotic Resistance (AR), Antibiotic Use (AU), and COVID-19. For the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria. <https://www.hhs.gov/sites/default/files/srinivasan-covid-and-amr-overview.pdf>

² FDA's COVID-19 Frequently Asked Questions: <https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-frequently-asked-questions>

³ Perez S, Innes, GK, Spalding Walters M, et al. Increase in Hospital-Acquired Carbapenem-Resistant *Acinetobacter baumannii* Infection and Colonization in an Acute Care Hospital During a Surge in COVID-19 Admissions — New Jersey, February–July 2020. MMWR Morb Mortal Wkly Rep 2020; 69(48):1827–1831. DOI: <https://www.cdc.gov/mmwr/volumes/69/wr/mm6948e1.htm>

⁴ Robert A. Bonomo, et. al. Carbapenemase-Producing Organisms: A Global Scourge. Clinical Infectious Disease. 2017(00):1-8.

⁵ <https://www.cdc.gov/hai/organisms/cre/cre-clinicians.html>

⁶ Gary R. Sakankey. A Practical Guide to Diagnosis and Treatment of Infection in the Outpatient Setting. 2005.