Out of Hospital Cardiac Arrest Burden and Outcomes: Evidence for Racial and Ethnic Disparities

by Sumeet Chugh MD

The purpose of this presentation is to set the stage for discussion on out of hospital cardiac arrest, burden and outcomes and to discuss the evidence for racial and ethnic disparities. We begin by looking at burden of OHCA and how your neighborhood, race, and ethnicity might influence this burden. We also discuss what we know about disparities in treatment within the chain of survival. How do these disparities have an impact when based on race and ethnicity in regard to bystander CPR, AED, advanced cardiac care and survival?

There are studies on cardiac arrest for over 20 years in Oregon and California. We can use this information to predict cardiac arrest and outcomes. Early data from OR on the burden of OHCA demonstrates that socioeconomic status—incidence of OHCA is highest in the least affluent neighborhoods and drops as you become more affluent. Regardless of gender, Black residents have a two-fold higher rate of cardiac arrest than White residents, present younger and have unique profiles. We need more work to understand how prevention might need to be modified depending on race. In California, study on Hispanics shows that geography matters. Blacks, Hispanics, and White residents have the same annual incidence, but Asian residents have the lowest annual incidence. In this community there is a much smaller proportion of Black residents.

There are also treatment disparities that exist for OHCA Chain of Survival. Using CARES database, the probability of getting bystander CPR is dependent on the neighborhood. As the proportion of Black residents increases the likelihood of getting bystander CPR decreases. Also, the more affluent the neighborhood, the higher the chances of getting CPR. Race/ethnicity and socioeconomic factors impact bystander CPR. This is seen in Black and Hispanic neighborhoods. Low socioeconomic matters and has an additive effect when combined with certain race/ethnicities. For example, lower socioeconomic neighborhoods that were also predominately Black had the lowest bystander CPR. In Black neighborhoods, all of the following are lower compared to Whites: bystander CPR, witnessed arrest, presentation of VF/VT arrest, survival to hospital admission, and survival to hospital discharge. Bystander CPR and layperson use of an AED is also lowest in predominately Black neighborhoods.

In advanced care there is clear evidence of disparities as well. A study in California looking at advanced cardiac care found that female-sex and non-White race were independently associated with worse neurologic recovery, lower rates of treatment at a 24/7 PCI center, and lower rates of cardiac catheterization.

In summary, there is a lot of evidence for significant race/ethnicity inequities and socioeconomic status matters and contributes to the disparities. We need to further discuss studies needed and calls to action.

Opportunities & Challenges: Data for Equity Research and Performance Improvement

Presenter: Remle P. Crowe, PhD, NREMT

When it comes to surviving cardiac arrest, your zip code is one of the strongest predictors. Here is a short YouTube video that helps illustrate how social determinants of health affect health outcomes: https://www.youtube.com/watch?v=Eu7d0BMRt0o.

As research and quality improves, we aim to increase equitable outcomes for patients who experience out-of-hospital cardiac arrest. Luckily, we have more data at our fingertips than ever before. Or is that really lucky? When it comes to having so much data available there are a lot of common pitfalls to avoid. Here are three:

1. Correlation is NOT causation. We've heard this mantra before, but it bears repeating, especially in cardiac arrest research where much of the data tends to be observational rather than randomized controlled experiments.
    a. When we examine outcomes by race and ethnicity, are we examining a biological mechanism or a social mechanism? Most of the time, we are looking at the effects of *social* mechanisms.
        i. This is a big deal because this means that race and ethnicity do not cause an outcome, but rather patients of certain races and ethnicities may be more likely to experience harmful social determinants of health that make a bad outcome more likely.
        ii. This also means that when a clinician documents the race and ethnicity that they perceive the patient to be in the medical record, this data is valuable as it likely more closely reflects the potential impact of biases and racism than self-reported data. Again, we are often studying a social mechanism, not biological!
2. Study setting matters. In any research, it is important to think about where the data came from and whether that setting likely reflects where you would like to apply the findings.
    a. As an example, the British Medical Journal published a randomized controlled trial where one group jumped out of a plane without a parachute and the other group jumped out with a parachute. They found no difference in death or serious injury between groups. How?! The plane was on the ground! These findings would not likely repeat themselves at a setting of 30,000 feet.
    b. In cardiac arrest research, we should consider the demographic mix of the study setting. Are the observed outcomes on par with the mix of the population?
        i. For example, if 20% of cardiac arrests in a study are among Black patients, but 90% of the deaths are among Black patients, we are observing an important inequity.
3. Missing data. Sometimes what you don't see is as important as what you see.

a. As an example, after examining military planes that returned from battle, engineers used the bullet holes to decide where to reinforce the planes. But what about the planes that did not return? Where they had bullet holes is probably more important.
b. In cardiac arrest research if we are only looking at hospital data, we miss patients who were pronounced dead on scene by EMS. What if termination of resuscitation patterns are different for patients belonging to different racial and ethnic groups?

In the age of machine learning and artificial intelligence stay vigilant as biased data can lead to biased models and biased actions.

Synopsis of Presentation from Clay Mann, PhD, MS, MBA

Do EMS Clinicians Sufficiently Document Race/Ethnicity?

The purpose is to discuss the pragmatic process of documenting race/ethnicity. The three topics covered are:

i. What is available to the practitioner?
ii. How often they are collecting data on race, ethnicity?
iii. What are the barriers to collecting data?

Race and ethnicity are reported using the National EMS Information System (NEMSIS). The purpose is to collect standardize the patient care collection when someone calls 911 and EMS responds to provide patient care. The provider of the patient documents the information/demographics of the patient. Represents a census of all pre-hospital care across the country.

How are race/ethnicity documented in NEMSIS? Earlier versions collected race and ethnicities as separated elements. Providers expressed that the two-element approach was burdensome. There is now a more concise measure combining race/ethnicity into one, which is often used by NIH. The current version has one element that captures several measures of race and ethnicity. Every patient care report requires the provider to complete the race/ethnicity element and it is automatically shown when the provider opens the report and fills it out. There are validation rules and warnings will come up if race/ethnicity are not filled out.

Barriers to Race/Ethnicity Reporting? The pre-hospital environment is chaotic, dynamic and time limited. Data collection is often limited to what is considered "mission critical" and there are protocols that guide them on what needs to happen and what needs to be documented. EMS clinicians are trained to "observe" and document and documentation often occurs after the fact. In 2021, only about 19% of patients don't have race/ethnicity reported, which can be due to a critical presentation of the patient. About 20% we are missing data on whether a bystander provided care.