

**Draft Meeting Summary
Cardiac Services Advisory Committee
May 17, 2022, 7:00pm-8:30pm
Maryland Health Care Commission (MHCC)
Virtual Meeting**

CSAC Members

Chris Haas, D.O.
Josemartin Ilao
Thomas Matthew, M.D.
Jim Recabo
Jerome Segal, M.D.
Stuart Seides, M.D.
John Wang, M.D.
Stafford Warren, M.D.

MHCC Staff

Alexa Bertinelli
Eileen Fleck
Zoram Kaul
Theressa Lee
Paul Parker
Ben Steffen

Other Attendees

Diane Alejo
Talia Bailey
Judy Breitenbach
Eddie Fonner
Richard Jones
Terri Haber
Melva Meminger
Julie Miller, M.D.
Mark Moffett, Ph.D.
Stephen Plantholt, M.D.
Jeanne Ruff

Eileen Fleck welcomed Cardiac Services Advisory Committee (CSAC) members and noted that slides for tonight’s presentation, an updated roster, and a revised meeting summary were sent out shortly before the meeting. She noted that there had been a few changes in the CSAC membership. For the revised meeting summary for the meeting held on January 18, 2022, she noted that the list of attendees was updated with corrections, but otherwise she did not receive suggested changes. She proposed finalizing the meeting summary if there were no additional changes. No one objected. She asked Mark Moffett, Ph.D., to share information on his background and experience, before beginning his presentation.

Dr. Moffett noted that he has a doctorate degree in economics and has been doing health policy and health services research for about 20 years. He has worked for Advanta Government Services for over two years. To provide context for the more recent analysis, he explained that he

would first describe the previous study conducted on behalf of the Maryland Health Care Commission (MHCC). The prior study examined the effect of STEMI PCI volume on inpatient mortality rates. He noted that inpatient mortality was determined based on patient disposition. The key findings from the first study include that high volume has a protective effect. This effect was not present for each year of data, but the effect was present for the data aggregated over time.

Dr. Moffett also noted that the previous study found that hospitals with relatively high STEMI volume had lower mortality rates. This seemed a bit counter-intuitive because eight of the twelve low volume hospitals had cardiac surgery on-site. It was suggestion that mortality may be worse at low STEMI volume hospitals with cardiac surgery on-site due to higher levels of deprivation, more transfer cases, and more rescue PCI cases. Examining those characteristics became the focus of the second study.

Dr. Moffett explained that the Area Deprivation Index (ADI), which was used in his analysis for the second study has several domains, including education, income, employment, housing, and household characteristics. Education is categorized as less than nine years, high school degree or higher, and white-collar job. Income is categorized based on median family income for the area and income disparity. Income disparity is defined as the percent of the population under the poverty level divided by the percent of the population earning \$50,000 or more income. Employment is measured as the percentage of the workforce unemployed. Housing is measured by metrics that include the average mortgage amount, the percent of homes that are owner occupied, and whether or not a home has plumbing. Household characteristic measured include: car ownership, single parent household, no phone, and greater than one person per room.

Dr. Moffett explained that the ADI was developed out of the University of Wisconsin and is primarily used at the census block level, which are areas of about 4,000 people. He worked with zip code areas, and ADI information tabulated to that level. He explained that the data for the ADI comes from the American Community Survey, and the ADI calculations are a weighted sum from the variables in each domain. The ADI is used to compare across local areas. He also explained that low deprivation corresponds to the lowest quintile for ADI in his analysis of the data, and high deprivation corresponds to the highest quintile for ADI. Dr. Moffett next presented a slide with a map of Maryland showing the ADI distribution by quintiles and the hospitals identified r STEMI at high and low STEMI volume hospitals with the ADI quintiles shown.

Dr. Jerry Segal commented that the low volume hospitals are tertiary hospitals, and those hospitals are located in or near big cities, which explains a greater percentage of patients for those hospitals having low socioeconomic status. He asked if other confounding factors may be driving the results. Dr. Moffett agreed that there are other confounding factors, specifically the transfer cases.

Jose Ilaomartin asked if the ADI component for housing was based only on plumbing, a binary variable. Dr. Moffett responded that the housing component of the ADI is not just based on plumbing. He noted that most housing does have plumbing, and it is not highly weighted. Family income is the highest weighted measure within the ADI.

Dr. Moffett explained that when the ADI is put in as an explanatory variable for inpatient mortality in the regression equation and the high and low volume hospitals are compared, the impact of the percentile of deprivation can be evaluated. There is some volume effect, and with lower deprivation the odds ratio tends to decrease, as shown on slide 14. However, he noted that for the 20th to the 80th percentile, the difference is not statistically significant. He suggested that with a longer time period and more data, it may show that there is a pattern of higher deprivation resulting in worse inpatient mortality.

Compared to those with the highest deprivation, those with the lowest deprivation (under the 20th percentile) have a statistically significant and clinically meaningful lower likelihood of inpatient mortality. The odds ratio is almost half for people that have a STEMI and get PCI, for someone in the lowest ADI quintile compared to someone in the highest percentile. That tends to validate the ADI as an explanatory variable for outcomes.

Often the social determinants of health are related to chronic conditions, but his analysis shows it is relevant for acute care. Dr. Seides asked if Eileen or anyone else is surprised by the outcome. Dr. Seides noted that the results seems consistent with what CSAC members had posited. It is a different population that goes to tertiary care centers in cities. All those that work in those locations can see it. Dr. Haas agreed with Dr. Seides. Lower socioeconomic status is associated with worse outcomes. Those patients tend to be fearful of going to the hospital because of the expense, don't eat as well, and tend to smoke. With worse protoplasm, outcomes will be worse. It brings up the question for him, what should be done with the data. It could be viewed as a reason to be prejudiced against low volume hospitals or it could be acknowledged that outcomes are anticipated to be worse at certain hospitals for reasons outside the control of the hospitals and taken into consideration when comparing outcomes at different hospitals. He asked Ben or Eileen to comment.

Ms. Fleck responded that she did not think people should stay away from lower volume hospitals. The issue is something happening outside of hospitals, so it makes to address what is happening outside of hospitals. She added that it's best to get STEMI patients to a hospital for treatment. She observed that the difference in the odds ratio is very dramatic.

Mr. Steffen commented that it is important to keep in mind that hospitals are low volume for STEMI cases because of the nature of the transport system. In his view, the ADI suggests that when looking at primary care, for high-risk patients living in high ADI area, there is a need for more resources directed at those patients. However, for someone with a STEMI presenting, there is not much that can be done. It points to the need to focus on high ADI communities before the emergency presentation of patients. There needs to be more outreach and better engagement with primary care. The ADI has some importance not just for chronic conditions, but at the end stage of life when a person has grave needs. The consequences of high ADI can be quite significant.

Dr. Seides commented that there is public health piece, as described by Mr. Steffen and a risk adjustment piece. He noted that the American College of Cardiology (ACC) is continuing to refine its model for risk adjustment. Socioeconomic differences are among the hardest to adjust accurately. It is different than risk adjustment for chronic pulmonary disease or for renal insufficiency.

Dr. Warren asked Dr. Moffett if he had looked at the low volume hospitals without cardiac surgery (four hospitals total) to see if mortality is different than for other low volume hospitals with cardiac surgery (eight hospitals total). Dr. Moffett responded that he looked at the difference, without risk adjustment, and there was not a statistically significant difference, even with exclusion of salvage and transfer cases. Dr. Moffett stated that the mortality rate was 7.9% at hospitals without cardiac surgery on-site compared to 7.5% at hospitals with cardiac surgery on-site for all STEMI cases. After salvage and transfer cases were removed, the mortality rate was 4.7% at hospitals without cardiac surgery on-site compared to 4.5% at hospitals with cardiac surgery on-site. In neither case were the results statistically significant.

Ms. Fleck noted that there were a couple questions submitted through the chat box and read both questions. Judy Breitenbach asked, how does the data reflect individual behavioral characteristics like smoking and drug/alcohol abuse that may contribute to the STEMI event. Dr. Moffett responded that it is not directly controlled. The data has prior heart attack, which could indirectly reflect it. Obesity is also captured (BMI) which may be related. Zoram Kaul asked what impact may have resulted from analyzing data at the level of zip code area instead of the level of census tracts. Dr. Moffett responded that it would refine the analysis. He notes that with zip code areas there is a lot of intra-area variance. If the areas were more homogenous with respect to income, access to public transportation, schools, employment, etc., then the comparison between areas would become sharper.

Dr. Thomas Matthew asked if the low socioeconomic patients when broken out at high volume centers do better as compared to at low volume centers. He added that, if the answer is yes, then could something be gained from figuring out what the high-volume centers are doing better. Dr. Moffett commented that has not been captured. The same patient is not necessarily better off at a high-volume hospital. Dr. Warren commented that he thought Dr. Moffett misunderstood the question and that he had not done the analysis necessary to answer Dr. Matthew's question. Dr. Moffett agreed he had not done the necessary analysis. He looked at the overall effect on the volume.

Dr. Matthew agreed that Dr. Warren understood his question. He further explained that his concern is two-fold. If low volume centers have a higher percentage of patients with poor outcomes, then it can make a big difference in performance measures because of the low volume. Another CSAC member agreed. He asked, are high volume programs masking effects of low socioeconomic status or are they doing something different that can be learned and passed along to other hospitals. Dr. Moffett stated that he does not have an answer. Ms. Fleck responded that doing the statistical analysis to see what it shows could be useful. Dr. Warren commented that data seems consistent with what he expects that low-volume tertiary hospitals are more likely to have transfer cases, more salvage cases, and more patients with high deprivation levels. He agreed that the questions posed by Dr. Matthew are worth considering.

Dr. Seides commented that he would ask Richard Jones and his staff whether the number of cases is sufficient to draw a conclusion. Dr. Warren agreed that may be the case, but there could also be a trend. It could be worth reviewing again once two or three more years of data can be included. Ms. Fleck asked Dr. Moffett if he could answer how many cases or years of data are

needed to draw a conclusion. He responded that there would be very small numbers in some quintiles, maybe even zero in some cases. The data can be separated and analyzed as suggested. Dr. Warren suggested tertiles instead of quintiles may be better. Dr. Moffett emphasized that the analysis would only provide a limited amount of information and not provide a complete answer. Dr. Haas commented that the ACC allows for risk-adjustment to even playing field. The ACC knows that if patient has a poor prognosis, outcome is likely to be poor. He doesn't expect a different conclusion would be reached.

Dr. Wang commented in the table on slide 12, the percentage of cases in the "unknown" category is much higher for the low STEMI PCI volume hospitals than the high-volume hospitals (6.8% vs 12.5%). That difference could greatly affect the trends. He asked if there was an explanation as to why there is a difference in the percentage of unknown patients. Dr. Moffett noted that most are post office boxes. If someone has a post office box, the person cannot be grouped because it is unknown where the person lives.

Dr. Matthew asked if you take out low socioeconomic patients, would that make up all of the difference, it seems unlikely. If there are differences in processes at low versus high STEMI PCI volume hospitals, that could play a role too. It is worth figuring out what is going on. Dr. Matthew noted that on Thursday his two-year term as president of the Maryland Cardiac Services Quality Initiative (MCSQI) will end. During his time participating in MCSQI, he has seen high volume programs give good information to other programs, such as tenets on blood transfusion. This has resulted in other hospitals, like Suburban, using less blood. The lower volume hospitals lacked the volume of cases needed to parse out that a better approach was possible. He also mentioned an example from the 1990's in which best practices were shared that allowed low performing cardiac surgery hospitals to improve their performance to at least average. That kind of thinking works.

Dr. Matthew asked whether other clinical staff on the call agreed with his thinking. Dr. Warren and Dr. Haas both agreed that the best use of the data would be to share knowledge from high volume programs who perform better than others that allows low volume programs to improve the quality of care provided. Dr. Matthew again noted that the goal is to make everyone better.

Ms. Fleck commented that transfer cases are not controlled for in the analysis of patients at high and low STEMI volume hospitals by ADI (shown on slides 12 to 14). Dr. Moffett confirmed that is the case. Ms. Fleck stated that the dramatic differences should be interpreted with some caution and should be reviewed more closely before deciding what to do. She specifically had in mind the odds ratio for inpatient mortality for those with the least deprivation (in the lowest quintile) which was much lower compared to the odds ratio for those with the highest level of deprivation.

Mr. Ilaio asked if MHCC has the authority to create a policy to promote sharing of best practices. He asked what action can be taken by the CSAC. Mr. Steffen responded that the CSAC is an advisory body to MHCC. The CSAC could make recommendations on additional data gathering, which MHCC could consider adopting in regulations. He also noted that the CSAC could launch an initiative on its own which would be voluntary for hospitals.

Dr. Warren noted that one of the main system changes has been the door-to-balloon time. He asked if there are differences in door-to-balloon time at low versus high volume hospitals. If there are differences, he suggested that it could be a learning opportunity. Ms. Fleck thanked Dr. Warren for that suggestion and asked others what they think. Mr. Steffen asked Julie Miller, M.D. for her thoughts on the suggestion from Dr. Warren.

Dr. Miller responded that she agrees with Dr. Warren's comment that door-to-balloon time would be an interesting metric. She also asked about the interpretation of ADI with respect to different types of STEMIs parsed out, such as those in the field versus in the hospital. Dr. Moffett stated that he did not have that information in the data provided to him. Ms. Fleck added that the data had not been analyzed for the subsets suggested by Dr. Miller, and she agreed with Dr. Miller that it could be worth looking at outcomes for different types of STEMI for high and low volume hospitals.

For slide 15, Dr. Moffett explained that he looked at other reasons for differences in high and low STEMI PCI hospitals, specifically the source of admission. He noted that transfers are more common for low STEMI volume hospitals as compared to high STEMI volume hospitals, and the difference is statistically significant (19.5% versus 9.2%).

For slide 16, Dr. Moffett noted that delay is defined as non-systemic delays. It has to be measured within the first 90 minutes. There was no statistically significant difference for high versus low STEMI PCI volume hospitals.

For slide 17, Dr. Moffett showed his analysis of differences in high and low STEMI PCI hospitals for time from symptom onset to first device time. He noted that 15.4% of the STEMI cases are missing symptom onset time. Dr. Warren commented that even with good data on that it would not help with addressing the door-to-balloon time issue. Dr. Moffett agreed. Later in the meeting Dr. Haas commented that the mean time from symptom onset to first device time did not seem right. Dr. Wang commented that the metric is almost irrelevant. It is a self-reported measure. It depends on whether patient is a good historian or not. Clinically, the measure is not useful. It is difficult to interpret. Dr. Haas agreed. He stated that he has never opened a patient's artery within 42 minutes of onset. Dr. Moffett and MHCC staff took note of this feedback.

For slide 18, Dr. Moffett showed his analysis of differences in high and low STEMI PCI hospitals for arrival time to first device time. He noted that the difference were not statistically significant.

For slide 19, Dr. Moffett showed his analysis of the impact of time delays on inpatient mortality for STEMI patients over the period of 2018Q2 to 2019Q4. He noted that for STEMI patients who had a PCI procedure and a delay had 5.4 greater odds of inpatient death than other STEMI patients who had PCI without a delay. The reasons for delay with the breakdown by category were presented on slide 20. The most frequent reason for PCI delay was cardiac arrest and/or need for intubation before PCI. Dr. Moffett noted that the distribution of reasons for delay was similar for high and low volume hospitals.

Prior to Dr. Moffett explaining the findings on slide 21, Dr. Hass noted that his hospital gets zero transfers and maybe one rescue patient per month. He commented that low volume hospitals, like his, have patients who may have symptoms for three days before coming to the hospital, which really changes the protoplasm.

Dr. Moffett noted that when both salvage and transfer cases are removed for high and low STEMI PCI hospitals, there does not appear to be an impact of volume on mortality for STEMI patients. The difference was not statistically significant.

Dr. Moffett provided a summary of the key conclusions on slide 22 with respect to socioeconomic deprivation and other factors associated with inpatient mortality. These include that low STEMI PCI volume hospital treat patients with higher deprivation as measured by the ADI. Also, ADI and volume have a significant impact on inpatient mortality for STEMI patients from areas with the least and most socioeconomic deprivation. In addition, low STEMI PCI volume hospital receive a higher proportion of transfer patients from other acute care hospitals and treat a higher proportion of STEMI patients who are categorized as salvage patients.

Dr. Moffett concluded his presentation and asked if he had missed any questions in the chat box. Ms. Fleck responded that Terri Haber asked about arrival to device time and whether that is the same as door-to-balloon time. Dr. Warren stated that it should be the same. Ms. Fleck also noted that Dr. Miller commented that the transfer and salvage cases are important to take into consideration. Ms. Fleck and Dr. Moffett agreed with Dr. Miller.

Terri Haber commented that she has noticed that for smaller rural programs it often takes longer to get the team together for STEMI cases. That could be a factor with longer door-to-balloon times.

Mr. Steffen asked if anyone else had additional comments. Dr. Warren responded that the large number of unknowns (no ADI quintile assigned) should be looked at more. No conclusions can be drawn about differences on door-to-balloon time.

Dr. Moffett noted that if there is a delay with getting the team together to perform PCI services that would be a system delay and would not be captured as a non-system reason for delay. That would not be in the “other category” for delay reasons, which are only non-system reasons for delay.

Mr. Steffen commented that some questions outstanding from the last presentation had been answered with the new additional analysis. He noted that a key issue raised in the meeting tonight was, how can information be used as an educational tool. He also noted that Dr. Wang raised a concern about the number of zip code areas for patient records that could not be assigned an ADI quintile. He suggested people contact Ms. Fleck if they had other thoughts on the discussion at the meeting tonight. He noted that funding for the work has been exhausted. He said the work had been informative for staff and thanked Advanta Government Services. He also noted that the results would be shared with staff for the Health Services Cost Review Commission which more broadly uses the ADI in the total cost of care model. The meeting was adjourned at approximately 8:30 p.m.