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**Key Words:** CABG, DCI, health outcome disparities, socioeconomic status

## Discussion

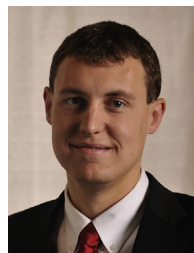


**Dr Julie A. Swain** (*New York, NY*). In the early 1980s, our renal transplant colleagues taught us that for graft survival and patient survival one of the most important determinants was socioeconomic class, and we have since not done much with that. That needs to change a great deal.



**Dr Jeffrey B. Rich** (*Virginia Beach, Va*). I congratulate you on taking the analytics to the next level. One of the challenges is converting this information to real action steps in terms of thinking about what variables preoperatively, perioperatively, and postoperatively affect outcome now that you know in these distressed communities there is a deficiency.

Do you have any insight about that, or how do you expect to explore that as a next step, because that's where we need to be leveraging this information. Fantastic as it is, now we have to figure out on action steps to execute.



**Dr J. Hunter Mehaffey** (*Charlottesville, Va*). Absolutely, I think this is a really critical point that you raise. The nice thing about DCI is that it really just looks at the community level. There are wealthy patients from poor communities and poor patients from wealthy communities, but what DCI is really measuring is the resources in that area. Hospitals are looking at where are we going to put our outreach clinic, where are we going to focus our resources to prevent adverse event. Maybe these people should be going to a skilled nursing facility first before they go back home. I think it's metrics like this that we should be using to determine our resource allocation.

**Dr Rich.** You may argue that some of the disease manifestations in those distressed communities where they don't have preoperative diabetic care and postoperative hypertension are variables that are important from a medical standpoint as much as a process and a provider standpoint. I look forward to your further investigation of that. Great work.



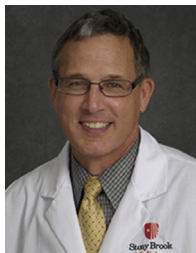
**Dr Valavanur A. Subramanian** (*New York, NY*). I was part of the New York Cardiac Advisory Committee for 12 years, and during this period we did some studies to look at access to care in the so-called distressed community. By the way, the distressed community index costs approximately \$65,000. That's not bad, actually. Most of the young people earn only a little less than that now.

But we looked at the East Bronx. It was striking that true access to care at least was very compromised, age, family value, and the culture issues we looked at, and we looked at once you recommended treatment can you follow through with that.

I think this goes beyond coronary bypass care, because we don't have the denominator, because a lot of these people are denied or they deny, self-denial. So we have a bigger problem in our healthcare policy to look at the denominator where the surgeons deny, because bundled payer and the readmission rates are all going to be high in that population. I don't know how to address that, because that's a bigger problem. We deny a lot of patients for access to care that we think is appropriate.

**Dr Mehaffey.** That's an excellent point. As Dr Rich mentioned, we did start looking at several different populations in the Virginia cardiac surgery population but also other surgical populations, because I think surgeons lead the movement in collecting patient data and following outcomes. We are starting to work with some of our medicine colleagues at the University of Virginia in our Health Policy Institute to look at medical outcomes and things like heart failure

readmissions using the DCI as a way to stratify these patients, because I think you make a great point: A lot of these folks have such limited access they never even make it to surgery.



**Dr Thomas V. Bilfinger** (*Stony Brook, NY*). Is there an association between the STS Predicted Risk of Mortality and the specific subcomponents of the DCI or is there an explanation why you chose not to look into that? In other words, do you verify the independence of the DCI components with the major risk factors used

in the STS risk model, because you showed that the DCI as a whole is an independent risk factor but not the subcomponents?

**Dr Mehaffey.** Correct.

**Dr Bilfinger.** So the second question I have is, for the purpose of this study patients were assumed to have equal access to local cardiac surgical care despite their own ZIP code, although in the model, hospital was adjusted for as a random effect. Were other confounders such as distance traveled, DCI score of the hospital ZIP code, the hospital, and so forth explored, because I would argue that the hospital component alone is not the only reason for the problem we are having.

The DCI was made up in 2014 for the sake of a political discussion. It is a snapshot in time made up from temporarily disparate data and not available as contemporaneous point-of-care data, which is the hallmark of the STS model. So how do you propose to deal with that shortcoming of the DCI going forward?

**Dr Mehaffey.** These are all excellent questions. I will answer them in reverse order. First, the economic innovation group is a think tank outside of Washington, DC, and this highlights the importance of collaboration. They put forth an idea, a proof of concept, and we took that and applied it to real patient-level data, and I think this environment of collaboration should continue. I certainly wouldn't argue that DCI is the end all, be all, but I think that taking measures from census data, from publicly reported data and stratifying these communities is critical and will be critical to moving forward.

Your second question about travel distance and location of the specific hospital, we were not able to look at those factors in the national data set. However, we have explored this in the Virginia collaborative and found some interesting findings that are currently under review for publication. We demonstrated when patients travel beyond their closest center, they usually are higher risk but actually do really well. So I think there are some factors that we weren't able to get into with the national data that our group is certainly working on. I think those are excellent questions.

And then your first question was about collinearity of variables in DCI and the STS model. Absolutely. That's why we highlighted the relationship between DCI and race. For years our modeling has used surrogates for SES like insurance status and race, but I think that the point of this talk and this work is to show that we have to move beyond that. If we can't get patient-

level economic data and adjust for those specific factors, maybe we can look at the community level, because those data are Health Insurance Portability and Accountability Act compliant, available for a wide variety of patients and easily implementable into a risk model. But I think those are all excellent points, and I appreciate your comments.

**Dr Rich.** But if you bring this all together, back to Bob Higgins' point and Dr Subramanian's point, maybe we ought to have a patient distress index, because there is a socioeconomic DCI, and our next article is going to discuss the lack of insurance. And your point about access. So maybe access, lack of insurance, plus a DCI will give us a more holistic picture of our patient, and we would be able to do better risk modeling, because, as you said, wealthy people live in DCIs and poor people live in non-DCI communities. So it might be important to bring this down from the patient level.

**Dr Subramanian.** I guess one of the questions is, how do you get away from census data, which we only had every 10 years? That's a problem.

**Dr Mehaffey.** That's something I can tell you the UVA Health Policy Institute is working on, aggressively looking at all types of measures, looking at payer status through our hospital economic office, travel distance, and community factors. However, the short answer is it's really difficult but we are going to continue to work on that, because I do think it is critical for our path forward in healthcare.



**Dr David M. Shahian** (*Boston, Mass*).

In response to that last comment, STS is negotiating a contract with an external vendor that would provide us with a very robust socioeconomic index for every patient in the STS database.

I would favor adjusting for these factors for cost measures. It is more debatable whether one should adjust for them in clinical quality outcomes, because that basically justifies poorer outcomes for vulnerable, disadvantaged, or minority patients. That's wrong, certainly for short-term outcomes like mortality. On the other hand, for readmissions, it is very reasonable to account for socioeconomic and sociodemographic factors, because these have a significant impact on the probability of readmission and they are often out of the hospital's control. But even for readmission, we don't want to simply accept that because a patient comes from a disadvantaged area they are going to be readmitted more often. Rather, we should be targeting such patients for enhanced follow-up, perhaps even sending nurses or physician assistants into the community, checking their wounds, making sure they are getting the right medications, assuring they have transportation back to their follow-up appointments, and providing other types of assistance.

**Dr Mehaffey.** Absolutely. That's a good point that needs more attention. However, as we move into bundled payments and tying reimbursement to outcomes, it is critical to adjust for these factors.