outcome perspective and this justifies the risks of prolonged transfer times and delayed surgical intervention. It is this premise that becomes synonymous with regionalization.

The authors have attempted to address a contentious and debated subject and have justified their conclusions by selected references and outcomes from the large international databases despite the limitations of such sources. What has been unfortunately omitted is clarification of the term *regionalization*. Is the transfer for care of a specific patient population to a surgical center with documented expertise, in fact what regionalization actually represents? Rather, isn't this perception of regionalization incomplete? Wouldn't regionalization also require closure of all institutions that perform fewer than an agreed upon minimum number of cases, as well as closure of centers with poor clinical outcomes regardless of volume, centralizing such care to high-volume centers with excellent documented outcomes? This represents a very real, but different, issue that is not addressed. Given the societal demands for transparency of institutional and surgeon results, it is this relevant question that will need to be addressed sooner rather than later.

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Commentary: A situation where time is of the essence except when it is not

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CENTRAL MESSAGE

In the treatment of ATAAD, the risk of delay is balanced by experienced hands.

Does the survival of a patient with an acute type A aortic dissection (ATAAD) depend on being in the right place at the right time? Approximately 60 years ago, a young physician experiencing incapacitating chest pain was most certainly in the right place at the right time, when, for the first time, surgeons were able to successfully repair an acute dissection of the aorta by resuspending the aortic valve and reapproximating the dissected layers of the ascending aorta.[1] Here, unknown forces brought the patient to exactly

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the right treatment center, where a diagnosis could be made long before the era of computed tomography, and where the world's most experienced aortic surgeons were ready to try something novel and lifesaving.

Since that time, repair of ATAAD remains a formidable challenge to diagnose, and repair entails substantial mortality and morbidity that appear driven by time; mortality rates are given by the number of hours after onset, and any delay risks death or a life-altering complication. In contrast, the article by Gambardella and colleagues[2] from Weill Cornell suggests that delay in such patients may not be detrimental if that delay is used to transport patients to a more experienced aortic center. The authors set forth their argument by reviewing key publications from the International Registry of Acute Aortic Dissection and the German Registry for Acute Aortic Dissection, and articles relying on data from the US Medicare and Nationwide Inpatient Sample, the United Kingdom's National Institute of Cardiovascular Outcomes Research, and the Society of Thoracic Surgeons, as well as studies from experienced centers.

Patients with ATAAD present for repair at a variety of hospitals; this includes centers that do not perform any open aortic surgery, those with low volume, and those deemed high volume. Clearly, patients with ATAAD must be transferred from centers unable to treat them as well as redirecting some patients who present to inexperienced centers. The authors accurately present the conflict between immediate repair in a low-volume aortic center and delayed repair in a high-volume center. Regarding patients undergoing complex aortic repair, such as that to treat ATAAD, there are well-established findings of notably reduced mortality and morbidity when treated by experienced surgeons at high-volume centers.[3-5] Once a diagnosis is established, is it in the best interest of patients to be transferred to an experienced center? Is the delay in treatment that transfer necessitates—and the related risk of increased rates of death—offset by superior outcomes in regional centers of excellence?

If the risk of mortality in those with ATAAD is approximately 1% to 2% per hour, and the time needed to transport patients from a low-volume center to a high-volume center is 2 hours or less (as the authors speculate), then the potential cost of delaying care to transport a patient is an approximately 2% to 4% increase in mortality. This risk must be weighed against the benefit of repair in an experienced high-volume center compared with a low-volume center. The authors of the current study[2] establish this potential benefit as a 7% to 10% reduction in mortality, clearly swinging the balance in favor of transfer.

From a practical standpoint, it can be difficult to elucidate specific outcomes for transferred patients. These patients tend to hide within the volume of surgeries at experienced centers, and rarely do single-center results separate rates of mortality and morbidity by transfer status. Although the review by Gambardella and colleagues[2] includes a recent study by Goldstone and coauthors[6] analyzing Medicare data and reporting outcomes by transfer status, the classification of high-volume centers is troubling. Centers performing at least 105 proximal aortic repairs over 15 years (1999 to 2014) were considered high volume—this is less than 10 proximal aortic repairs each year. Thus, it is difficult to assess the true benefit of transfer to a high-volume center, when "high volume" might be less than 1 case per month.

However, we owe it to our residents to ensure they are all able to perform surgery for ATAAD. Repair of ATAAD by trained cardiothoracic surgeons is a basic skill that must be relied upon for circumstances in which hospital transfer is not practical, such as a hemodynamically unstable patient who needs emergency repair or when the distance between centers is simply too great to permit a safe transfer. Our residents need to leave our programs confident that they can handle such repair. The intuitive benefits of an aortic training program include greater exposure to all types of proximal aortic repair, which in turn better prepares the surgeon for the less common patient presenting with ATAAD.

Next, we all need to envision what regionalization of care for ATAAD might look like, as we move to strengthen informal transfer networks that currently exist to a formal referral strategy. If repair of ATAAD is further concentrated in experienced hands, it is possible that contemporary trends toward improvement will be amplified.[7] Such change is not unprecedented, as the authors note the implementation of a dedicated training program led to an impressive reduction in mortality rates for patients with ATAAD, from approximately 34% to 3%.[8] Although transfer may reduce mortality and morbidity after repair for ATAAD, sometimes surgeons will have to rely on their training to rise to the challenge of ATAAD, right here and right now, rather than defer repair and seek transfer of these complex patients. Thoughtful clinical judgment, founded on experience and individualized treatment paradigms, maximizes short- and long-term prospects for these critically ill patients.

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