individual patient's needs, and to replace/upsized them as needed.

We have several practical tips for stenting of type 3 and 4 bronchial stenoses:

1. We have found that stenting of the subsegmental airways does not benefit the patient. Thus, we limit our stenting to the bronchial and segmental airways.
2. We calibrate the size of stent to be placed based on the size of the rigid bronchoscope that we are able to insert in the portion of bronchus affected. For example, if we are able to cannulate the affected bronchus with a 10-mm rigid bronchoscope, we would size the proximal portion of the stent to 10 to 12 mm.
3. For difficult and long stenoses, we often dilate the bronchus/segment and insert as large a stent as possible. In 2 to 3 months, we remove the stent and replace it with a larger diameter stent. This can be done sequentially to maximally dilate the affected area.
4. For distal left-sided problems, we routinely place the stent over the bifurcation of the upper and lower lobes and cut a small circular segment out of the stent using a 6-mm dermal punch (Acuderm, Fort Lauderdale, FL). This stent contouring maintains the integrity of the stent while allowing for ventilation of the upper lobe, which would otherwise be obstructed.
5. For distal right-sided problems, we use step-down stents of various configurations (Hood Silastic 2-Step Stents with Posts and Mesh: Hood Laboratories). A step-down stent is one in which the proximal diameter is larger than the distal diameter, with tapering of the stent diameter in between. Step-down stents allow coverage down to the level of the superior segment of the lower lobe and right middle lobe, while maintaining patency and coverage of the anastomosis and proximal mainstem bronchus. We usually cut a 6-mm dermal

punch hole in the stent for the right upper lobe to allow ventilation to this lobe. The right upper lobe orifice is often variable in its position, so we have not found stents with premade orifices effective for use.

6. While inserting Silastic stents, we have found that it is important to place the hole for a lobar orifice corresponding to the print on the metallic applicator (Dumon-Harrell applicator: Bryan Corporation). This configuration allows for easy rotation of the stent (clockwise for right bronchial stents, counterclockwise for left bronchial stents) into the appropriate position as it is deployed. After stent deployment, we then often put a flexible bronchoscope through the rigid bronchoscope into the stent while using rigid forceps to manipulate the hole into its most optimal position.

Our experience has been that bronchoscopic surveillance and sequential "up-size" stenting for distal long-segment stenoses is an effective way to permanently increase luminal diameter over a long length of airway.

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QUALITY IMPROVEMENT PROGRAM DECREASES MORTALITY AFTER CARDIAC SURGERY

To the Editor:

We read with interest the article by Stamou and colleagues,¹ who showed that a quality improvement program de-

creased mortality after cardiac surgery in a large cohort, using a risk-adjusted methodology. Most importantly, outcomes improved mostly due to fewer cardiac-related deaths. Moreover, there was a lower relative decline in mortality among patients with diabetes than among those without diabetes, indicating the influence of patient individual factors on outcomes. Finally, they conclude that future quality improvement programs should focus on high-risk patients, which they misclassified as those with diabetes. It would be more appropriate if the authors provide information about severity scores widely available in the literature instead.

Quality improvement programs follow institutional or regional/national initiatives. Although the latter are important to monitor and foster improvement of outcomes, the former are fundamental to develop a sustained and cost-effective system locally. Because processes of care vary widely among cardiac surgery programs, there are no "recipes" that can be universally applied, due to system-based particularities. Core components of the quality improvement program described by Stamou and colleagues¹ are important, but such programs should be presented in a problem-based approach. It would be interesting to know the problems responsible for the initial unfavorable outcomes. That would potentially guide other cardiac surgery centers in implementing similar programs. Moreover, information about the financial impact (investment and savings) of those programs is crucial, particularly in times of world economic crisis.

In Brazil, results of cardiac surgery are not as good as in developed countries.² Reasons are multiple, but certainly include different patient profiles, social problems, limited resources, and poorly developed hospital operating systems and integrated patient care. In our center, multimodal strategies were added, aiming for team building and a more organized and integrated hospital system. No substantial resource

investment was necessary. The impact of those strategies was analyzed by multivariate logistic regression (unpublished data). Risk-adjusted hospital mortality declined (from 11.5% to 3.6%, $P = .003$) after these strategies were implemented. Survival benefit was particularly evident in high-risk patients (Euroscore > 7), in which operations performed prior to the quality program were independently associated with greater mortality (odds ratio = 4.8; 95% confidence interval 1.6–17.4; $P = .005$). There was no difference in low-risk patients (Euroscore < 6). Therefore, multimodal strategies in our center remarkably improved the outcomes of high-risk cardiac surgery patients, as opposed to low-risk patients, which are probably less dependent on the system.

Quality in cardiac surgery is ultimately a surgeon's responsibility and should be part of the training of young surgeons. We would like to congratulate Dr Stamou and colleagues on their excellent work on an extremely important subject.

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Reply to the Editor:

We appreciate Dr Atik's kind comments and thoughtful questions. Additionally, his efforts are to be recognized and commended. Our quality improvement program (QIP)^{1,2} was developed to address opportunities to reduce mortality and mitigate the risk of

major morbidity (nosocomial infections, acute renal failure, hemorrhage, reoperations, etc) through elimination of variation while reliably applying the best available evidence as well as best practices. Regarding the comment about severity scores, The Society of Thoracic Surgeons (STS)–National Cardiac Database allowed us to compare our performance to national averages and guided our efforts. STS developed definitions for key data elements, providing a common language and standards. STS also developed risk-adjusted mortality and morbidity algorithms to provide benchmark measures that helped in the construction of our standard operating procedure. STS risk scores were routinely recorded in our QIP efforts and used to calculate expected mortality and compare it with the national average. However, reporting risk scores was beyond our focus. The most important finding of our article was that by building a QIP, a measurable and significant decrease in mortality can be accomplished, and on that regard, our article was among the first to report such a finding.

We tend to disagree with Dr Atik's comments that QIPs follow institutional or regional/national initiatives. A QIP can follow both national/regional initiatives and at the same time be tailored to each institution's needs and particularities. Our QIP was structured based on STS guidelines and best evidence practices but was also adjusted to our institution's particular goals.

An important finding of our work is that a QIP did not improve dramatically the outcomes on diabetic patients, as previously reported.³ Similarly, Van Den Berghe and colleagues³ demonstrated that with their intensive insulin therapy protocol, they were able to reduce mortality of all medical/surgical intensive care unit patients, except those with a prior history of diabetes. Our investigation corroborated this finding that diabetics are a high-risk subset of patients on which future QIP efforts should focus. The presence of small target vessels (diffuse coro-

nary artery disease) frequently encountered in diabetic patients, the higher risk for wound infection, and the higher risk of mortality compared with nondiabetic patients as well as the resistance of diabetic patients to improve with QIP initiatives provided the rationale for our proposition.

We tend to agree with Dr Atik's statement that "because processes of care vary widely among cardiac surgery programs, there are no 'recipes' that can be universally applied, due to system-based particularities." However, common denominators of successful QIP efforts include a dedicated multidisciplinary team with common goals, a systems-based approach, accurate communication, adherence to strict protocols, and monitoring compliance. In this respect, some universally applied rules may apply. Regarding the reasons for the change in outcomes, we believe there is a multifactorial etiology: mainly the absence of a dedicated multidisciplinary team, the lack of a monitoring tool to measure compliance to the protocols, and individualized rather than a team approach to clinical problem solving during the initial period before development of QIP. In contradistinction, our systems-based approach, standardization, team building, consistent and accurate communication, and active management of change and quality accounted for a recent decline of 48% in mortality.

The financial impact (investment and savings) of QIP is indeed crucial. We previously demonstrated that by implementing QIP, a significant increase in the early extubation rates, a decrease in intensive care unit stay, and resource utilization can be accomplished.² We are in the process of analyzing the specific financial impact of our QIP, and this will be the focus of a future publication. We believe that by using a unique database linking clinical and financial outcomes through a focus on quality, cost containment in cardiac surgical care can be achieved by identifying and