many of these valves are not and will not be amenable
to a long-lasting repair). Some of us are working on it.
Time is pressing.

Reference
outcomes of truncus arteriosus repair: a modulated renewal competing risks

Commentary: When complicated statistics may be the best way to
answer questions on complicated hearts

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In this issue of the Journal, Guariento et al report on a large
single-center series of patients with truncus arteriosus
treated at Boston Children’s Hospital over a 34-year period.
The real contributions of this article are not only the rela-
tively unsurprising clinical conclusions regarding the
impact of truncal valve insufficiency and original right-
sided conduit size on mortality and the risk factors for rein-
tervention, but also the reintroduction to the congenital
heart surgical community of the statistical methods used
to arrive at those conclusions.

Although surgeon-specific mastery of statistical methods
varies considerably, all have some familiarity interpreting
the normative Kaplan–Meier (KM) and Cox proportional
hazard (CPH) outputs. So what is this “modulated renewal
competing risk analysis,” and how does it differ from
what we are more accustomed to? Technically speaking,
it is a modeling approach that allows for multiple types of
outcomes and multiple observations/events per patient
over the course of the follow-up period. Patients are not
censored after the first occurrence of interest, save for mort-
tality, which may be cause-specific. Whereas KM curves are
graphical representations of raw data, the curves in this
article depict the results from “modeling” survival based
on functions and their associated parameters. The reason
for the parallel colored lines that may catch one’s eye and
distinguish them from more familiar KM curves is that there
is an underlying exponential function assumed to best
represent overall survival, and group differences are
estimated using a parameter of that function.

This methodology is not novel in our field but is more
commonly used in fields such as oncology, where the ques-
tion is whether the patient died from their cancer or from
some other cause. We commonly ask ourselves similar
questions, such as whether the patient died from their car-
diac disease or from some comorbid condition or genetic
syndrome. Our statistician colleagues inform us that
accounting for competing risks is generally a more statisti-
cally robust and sound methodology that can help account
for the fact that death and loss to follow-up may not be

CENTRAL MESSAGE
The statistical methodology used in this single-center study of pa-
tients with truncus arteriosus patients should be more widely
considered for studying patients

with congenital heart disease.

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Disclosures: The authors reported no conflicts of interest.
The Journal policy requires editors and reviewers to disclose conflicts of interest and
to decline handling or reviewing manuscripts for which they may have a conflict of
interest. The editors and reviewers of this article have no conflicts of interest.
Received for publication March 7, 2021; revisions received March 7, 2021; accepted
for publication March 8, 2021; available ahead of print March 11, 2021.
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J Thorac Cardiovasc Surg 2022;163:238-9
0022-5223/$36.00
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https://doi.org/10.1016/j.jtcvs.2021.03.024
the same thing when performing an analysis, a fact missed in KM and CPH methodologies.

We are left wondering whether this type of analysis should become more (or “the”) standard for longitudinal analyses after congenital heart surgery. In the least, it is a valuable tool providing results that could be added to, or compared with, those based on the more typical KM or CPH approaches. We all care most about the long-term outcomes of our patients and are constantly questioning how our decisions and actions during relatively short episodes of care affect them over the life span. This kind of analysis may help us better answer some of the questions that we all have about complicated patients in whom structural heart disease is often only one of multiple, and competing, risks they continually face.

References

Commentary: As good as new: Using modulated renewal to analyze reintervention after truncus arteriosus repair

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As survival for patients with congenital heart disease (CHD) continues to improve, it is important to continuously evaluate our measures of success for these patients. In the current era, the goals of care have expanded beyond simply improving survival. As such, management strategies aimed at optimizing functional performance and overall quality of life should be carefully considered. Such aims are particularly relevant for patients with truncus arteriosus (TA). Although complete repair in early infancy is the established standard of care, with a reported survival rate of 76.8% at 20 years, the morbidity for patients with TA is incurred in the form of multiple reinterventions. Because the right-ventricular outflow tract needs to be reconstructed with a right ventricle-to-pulmonary artery (RV-PA) conduit during the initial operation, multiple RV-PA conduit reinterventions are required. In addition, these children may need truncal valve (TV) reoperations, especially in the setting of abnormal TV morphology. For patients with TA, surgical strategies that minimize the frequency and invasiveness of reintervention would improve their quality of life and perhaps improve long-term survival.

As clinicians caring for patients with CHD, we often modify clinical and surgical practices in an effort to provide the most contemporary, evidence-based care. Similarly, it is