

# Personalized nomograms 'essential,' surgeons say

A personalized nomogram allows greater accuracy in refractive surgery, incorporating many variables that can affect outcomes.

by **Katrina Altersitz**

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A personal nomogram is a necessity for improving accuracy in refractive surgery, according to a number of experienced refractive surgeons.

A recent study by **Yunhee Lee, MD, MPH**, and colleagues showed

that two surgeons using the same nomogram and the same laser in the same operating room can have different results. A personalized nomogram helps to take those differences into account during surgical planning, Dr. Lee said.

Dr. Lee spoke about her study, presented earlier this year at Hawaiian Eye 2006, in an interview with OCULAR SURGERY NEWS. Also interviewed for this article regarding their use of personal nomograms were OSN Refractive Surgery Section Members **Peter S. Hersh, MD, FACS**, **Kerry D. Solomon, MD**, and **Noel A. Alpines, MD**.

"I think nomograms are essential," Dr. Solomon said. "Every room is different in terms of temperature and humidity. Every surgeon's technique is different. We just can't take what comes out of the box, apply it to the eye and call it customized surgery."

## The importance

In the study Dr. Lee presented in Hawaii, two surgeons with nearly identical techniques used the same laser in the same laser suite to perform LASIK using the same nomogram. When charted on a scatterplot graph, the curves of their results differed, she said.

"We would have expected that their nomograms would have been identical," she said. "When surgeon one and surgeon two attempted a minor dioptric correction, the outcomes differ by about 0.75 D, underscoring the need for a personalized nomogram for each surgeon."

Other surgeons interviewed all said they have been personalizing their nomograms for more than a decade. Dr.

Alpines even developed his ASSORT software to allow surgeons to personalize their nomograms.

"Personalizing nomograms provides greater accuracy in treatment to achieve results consistently closer to emmetropia," Dr. Alpines said. "The benefit for the patient is greater cer-

tainty of satisfaction with the visual outcomes. The surgeon benefits from a higher level of positive feedback from his patient."

## Getting started

For surgeons who have not developed personalized nomograms, the first step is to distinguish between factors that will stay the same in the surgical environment and factors that will vary from patient to patient, Dr. Lee said.

"Any variable that you manage to hold constant from case to case will



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not alter your outcome, and it will be one more variable that you don't have to track and analyze," she said. "Any variable that changes from case to case could potentially be important in predicting your outcome, and that would be a variable that you need to track and analyze."

Dr. Solomon agreed that consistency in every possible element is the key to proper use of a personalized nomogram. What can be standardized should be standardized – from the humidity and temperature in the operating rooms to the equipment used and the ablation size. All of these things must be taken into account be-

fore looking at the variables that will change with every patient, such as age or astigmatism, he said.

"It's important to be systematic," Dr. Solomon said. "In order to really build consistent outcomes, we need to be as consistent as possible with each and every parameter."

After as many factors are standardized as possible, Dr. Hersh said, the surgeon can obtain commercially available software to create a personal nomogram, such as the Holladay Refractive Consultant or Dr. Alpines' ASSORT system.

One can also create one's own nomogram using an Excel spreadsheet, as Dr. Hersh did.

"I would take into effect all the salient factors," he said. He suggested columns for age, sex, degree of spherical correction, degree of astigmatic correction, and for custom ablation procedures the degree of spherical aberration and degree of coma.

"Run the numbers for everybody and find out what your result is," he said. "What you're in essence looking at is the predictability of the sphere and the cylinder, and that is how close you are getting to what you're aiming for."

Results should be analyzed only when there is sufficient data, Dr. Hersh said. In his practice, he analyzes his postoperative data and makes necessary changes on a quarterly basis. He suggested having at least a "couple of hundred" data points in a nomogram before making any adjustments.

"You don't want to change your nomogram too early, and you don't want to change it too late. If you change it without getting a good cohort of data, you're tending to respond to outliers," Dr. Hersh said. "You want to wait a long enough time that the

data is meaningful and the edges are smoothed out a little bit, but you don't want to wait too long."

## Tips

Both Dr. Hersh and Dr. Solomon noted that personalized nomograms must be created for each instrument used, as well as each surgeon using them.

"Nomograms need to be specific if you're dealing with multiple lasers or multiple laser algorithms, ie, custom vs. convention, hyperopia vs. myopia, or two different microkeratomes," Dr. Hersh said.

"Making a nomogram incorporates

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a multiplicity of differences from surgeon to surgeon," including varying techniques," he continued. "It's sometimes hard to determine what the specific factors are that you're correcting for because it's really correcting everything."

Dr. Solomon emphasized that standardization is the key to optimizing nomogram results.

"Standardize your technique. Standardize your preop regimen, your postop regimen, your use of artificial tears," he said. "If you're trying to freeze the variability, you've got to be able to get good, accurate measurements."

He also suggested using fully healed outcomes 3 months postop-

eratively for nomogram adjustment, rather than 1 week or 1 month postop results, in order to get a better picture of final outcomes.

Dr. Hersh said a personal nomogram would benefit most surgeons.

"It adds accuracy and diminishes your enhancement rate because you have a better chance at homing in and achieving the desired correction," he said.

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