Understanding and Reporting Visual Acuity Measurements in Publications of Clinical Research

Visual acuity is an important measure for assessment of visual function. While there are many charts available to test visual acuity,\(^2\) there is lack of consistency\(^3\) in the methods of testing\(^4\) and methods of reporting\(^5\) visual acuity that may make comparisons difficult between visual outcomes among different published studies. In our opinion, most US ophthalmologists are familiar with the Snellen notation of visual acuity but have limited understanding of how other notations of visual acuity translate into Snellen notation. While some journals such as the *American Journal of Ophthalmology* provide charts to facilitate this translation, if the chart is not available at the time one is reading an article or listening to a presentation, understanding the level of visual acuity or changes in visual acuity may be limited.

Methods. The method of reporting visual acuity in clinical research in retina in 2008 was reviewed systematically to determine how frequently each method of acuity reporting was used among all retina articles published during the 2008 calendar year in 4 ophthalmology journals, including the *American Journal of Ophthalmology*, *Archives of Ophthalmology*, *Ophthalmology*, and *Retina*. Articles regarding case reports, intraocular tumors, and pediatric retina were excluded.

In addition, a survey to assess understanding of different visual acuity measurements was designed for 5 ophthalmology residents, 4 individuals obtaining advanced specialty training in retina following completion of an ophthalmology residency, and 5 faculty within a retina division at an academic medical center following approval of the study by the medical center’s institutional review board and after an oral consent process approved by the institutional review board. The questionnaire was proctored to ensure that the participants provided the answers without reference to other materials. Each participant was asked to give the Snellen equivalent (within 1 line) of various visual acuity measurements that were in non-Snellen formats, including a fraction of 10 notation (eg, 5/10), decimal notation (eg, 0.2), logMAR (eg, 0.1), letter count on an Early Treatment Diabetic Retinopathy Study (ETDRS) chart (eg, letter score of 65), and a fraction based on readings at 6 m (eg, 6/60).

Results. Among 356 articles identified in the 4 journals that were in the retina field, 206 reported visual acuity results. Methods used to report the visual acuity among these 206 articles included Snellen equivalent in 175 (85.0%), logMAR in 106 (51.5%), ETDRS letter scores in 67 (32.5%), decimal notation in 13 (6.3%), and metric fractional notation in 1 (0.5%). The 206 publications included 66 (32.0%) using Snellen notation only, 109 (52.9%) using a non-Snellen format and providing a Snellen equivalent, and 31 (15.0%) using non-Snellen notation alone. Among the 140 articles reporting acuity in non-Snellen systems, 83 of the 106 articles (78.3%) reporting logMAR and 54 of the 67 articles (80.6%) reporting an ETDRS letter score also provided a Snellen equivalent. Results were similar among the 172 publications specifying visual acuity as an outcome measure (data not shown).

Fourteen ophthalmologists among 14 volunteers completed the survey. No participants were able to interpret all 5 methods of visual acuity reporting correctly. Two participants (1 resident and 1 attending) demonstrated the ability to interpret 4 of the 5 methods assessed, while most other participants could not correctly interpret logMAR or letter score values within 2 lines of the Snellen equivalent. Ten participants (71.4%) were able to interpret visual acuity in the form of a fraction taken from an ETDRS chart read at 6 m (eg, 6/24). Eight participants (57.1%) correctly converted decimal notation into the appropriate Snellen equivalent. Seven participants (50.0%) correctly converted a fraction of 10 notation (eg, 4/10). Three participants (21.4%) were able to interpret logMAR acuity correctly, and none were able to interpret an ETDRS letter score correctly.

Comment. Uniformity in reporting visual acuity measurements in retina peer-reviewed published articles is currently lacking. Almost 1 in 6 articles did not provide Snellen equivalent values when visual acuity was an outcome, but our survey suggests that when an article provides visual acuity as an ETDRS letter score or logMAR, many ophthalmologists, regardless of their level of training, may not understand the Snellen equivalent level of visual acuity.

While the scope of this study is limited (only 14 participants were included in the survey, and all participants were from one academic institution) and the results do not necessarily mean that the individuals would not understand the results of the articles reviewed in their context or would not reference other materials to translate the results of visual acuity outcomes not provided as Snellen equivalents, the results bring into question whether ophthalmologists might understand rapid oral presentations at professional meetings that use letter scores or logMAR without Snellen equivalent information. Based on our findings, ophthalmic journals and organizers of oral presentations of ophthalmic studies might consider requiring approximate Snellen equivalents when visual acuity outcomes are provided using other notations, es-
Corneal Injury Secondary to Accidental Surgilube Exposure

Surgilube (Fougera, Melville, New York) is a common general-use lubricant found in health care settings. One container in which it is packaged is a small tube that can look similar to many ophthalmic ointments. Herein, we report 2 cases of ocular injury related to Surgilube exposure.

Report of Cases. Case 1. A 30-year-old man underwent an orbital fracture repair for limited ocular motility. During the surgery, Surgilube was accidentally placed under a cornea shield on the left eye instead of Lacri-Lube (Allergan, Inc, Irvine, California). The cornea shield was removed at the conclusion of the 2-hour orbital repair.

The left cornea appeared cloudy, and the eye was immediately irrigated with 2 L of normal saline. The limbus was injected 360° with no areas of ischemia. The cornea was diffusely hazy with a 4 × 3-mm epithelial defect. The patient was treated with erythromycin ointment and atropine sulfate topically as well as doxycycline hyclate and vitamin C orally.

The next day, the cornea had a large epithelial defect with a small rim of epithelium circumferentially at the limbus (Figure). The cornea was clear. Treatment with tobramycin and dexamethasone ointment (Tobradex) was started once at bedtime. The epithelial defect continued to slowly improve during the next 10 days. The epithelial defect resolved, and the patient’s visual acuity improved to 20/20. He did develop an area of haze inferior to the visual axis. He did not report eye irritation.

Case 2. A 46-year-old woman underwent a bilateral upper and lower blepharoplasty in which corneal protectors were used. Surgilube was mistaken for Lacri-Lube. At the end of the case, the corneas were opacificed and she was sent for an immediate ophthalmic evaluation.

She was found to have 80% to 90% epithelial defects in both eyes. Treatments with topical antibiotics, steroids, and artificial tears were started. The epithelial defects healed during the next 12 to 13 days. While her final best-corrected visual acuity was 20/20 OD and 20/25 OS, the patient was left with chronic photophobia, foreign-body sensation, and dry eyes. She was weaned off the steroids and antibiotics. Restasis and artificial tears were used to manage her dry eyes in the long term.

Comment. In our case reports, we have shown that use of Surgilube on the ocular surface can lead to slowly resolving epithelial defects and chronic irritation. The most likely ingredient in Surgilube to cause these toxic effects is chlorhexidine gluconate. The use of chlorhexidine gluconate on the cornea is known to have toxic effects. While Surgilube contains 20% chlorhexidine gluconate, another product, Hibiclens (Mölnlycke Health Care, Gothenburg, Sweden), contains 4% chlorhexidine gluconate but causes more severe damage such as corneal edema, endothelial cell loss, and bullous keratopathy. The difference in severity may be due to


Figure. Left eye on postoperative day 1 with fluorescein stain. Note the large corneal epithelial defect with a small rim of epithelium near the limbus.