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To the Editor

Wide-field fundus imaging has become an indispensable tool for practicing pediatric retina specialists. In the past decade, the use of wide-field fundus imaging has greatly increased for screening, diagnosis, treatment and follow-up care in a number of pediatric retinal disorders, especially premature infants at risk of retinopathy of prematurity (ROP).^{1,2} Because of the increasing role of telemedicine, the use of wide-field fundus imaging is likely to increase. Currently, the RetCam imaging system (Clarity Medical Systems, Pleasanton, CA) is the most widely employed wide-field digital fundus digital imaging system for imaging infants and young children. As it is a contact camera, concerns of safety, risk of injury to the cornea, and transmission of infection among this vulnerable patient population have been raised. Yet, to the best of our knowledge, there are no published reports of occurrence of ocular infection transmitted by the use of contact fundus photography in children and premature infants (PubMed search keywords: “infection,” “conjunctivitis,” “fundus photography,” “ROP,” “NICU,” accessed June 3, 2016). In an attempt to sample occurrence of clinically significant iatrogenic corneal abrasions and risk of spreading infectious conjunctivitis and keratitis during routine use of the contact wide-field fundus camera for ROP screening at the time of live exam or examination under anesthesia, we conducted a poll among 41 attendees of the 2016 meeting of Association of Pediatric Retina Specialists (APRS). The 40/41 APRS member respondents accounted for approximately 46,950 contact imaging examinations: 39,250 for ROP screening and 7,700 from examinations under anesthesia (Table 1). Most of the screening examinations were conducted under topical anesthesia, whereas examinations under anesthesia were conducted under general anesthesia. These results reflected the collective experience of centers in the United States (26), Japan (3), Mexico (2), and Brazil, Canada, Chile, France, Thailand, and the United Kingdom (1 each) (Table 1).

None of the participants reported an occurrence of infectious conjunctivitis, keratitis, or keratoconjunctivitis from the use of a contact camera for imaging. None of the participants reported corneal abrasions either. This was true also among a subset of retina specialists deemed to be high volume examiners (>500 contact fundus photographic exams performed) (Table 2). All participants had a protocol in place to disinfect the tip of the camera, which came in contact with the eye in between the patients. The vast majority of examiners used only alcohol, with 37 (92.5%) exclusively using an alcohol wipe (21 of 23 [91.3%] in the high volume group), one using bleach, one using alcohol or bleach, and one using another undisclosed agent (Tables 1 and 2). Taken together, this consensus demonstrates that with

experience of almost 50,000 contact imaging examinations, no reportable occurrence of imaging-related infection, with disinfection of the camera tip performed mainly with alcohol wipe.

It is the collective opinion of APRS that the contact fundus photography can be performed safely and effectively with minimal risk of clinically significant corneal abrasions, keratitis, or infectious transmission. Our collective experience suggests that the risk of infections spread by the contact fundus camera when the nosepiece is cleaned before and after each patient imaging session is exceptionally low. Considering the significant benefit of preventable blindness in children with ROP, FEVR, and other pediatric vitreoretinal disorders, the benefits of contact fundus photography far outweigh the risks. Alcohol wipes are most commonly used and seem to be sufficient for limiting the risk of transmitting infection with the camera nose-piece. Alcohol wipes circumvent the need for another device to aid in cleaning and eliminate the risk of residual bleach or other caustic agents reaching the cornea resulting in a chemical injury. A theoretical risk of Hepatitis C transmission exists with camera nosepiece with alcohol wipes alone, so we suggest an alternative means of camera tip disinfection for infants with known history of hepatitis C infection.

In summary, based on the clinical experience of nearly 50,000 examinations from NICUs around the world, we endorse continued meticulous use of alcohol wipes for this purpose. It is the opinion of APRS that contact fundus photography performed in this fashion seems to be safe, effective, and inexpensive.

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References

1. Schwartz SD, Harrison SA, Ferrone PJ, Trese MT. Telemedical evaluation and management of retinopathy of prematurity using a fiberoptic digital fundus camera. *Ophthalmology*. 2000; 107:25–28. [PubMed: 10647714]
2. Yen KG, Hess D, Burke B, et al. Telephotoscreening to detect retinopathy of prematurity: preliminary study of the optimum time to employ digital fundus camera imaging to detect ROP. *J AAPOS*. 2002; 6:64–70. [PubMed: 11997800]
3. Segal WA, Pirnazar JR, Arens M, Pepose JS. Disinfection of Goldmann tonometers after contamination with hepatitis C virus. *Am J Ophthalmol*. 2001; 131:184–187. [PubMed: 11228293]

Table 1

Summary of the Association of Pediatric Retinal Surgeons (APRS) Responses Regarding the Preferred Disinfection Technique for Contact Wide-Field Fundus Camera and Incidence of Infection and Corneal Abrasions

No. of APRS Attendees Polled	40/41	97.6%
Countries of origin	USA	United Kingdom
	Mexico	France
	Japan	Chile
	Brazil	Thailand
	Canada	Taiwan
Preferred disinfection technique, n (%)	Alcohol wipe	37 (92.5)
	Bleach	1 (2.5)
	Alcohol wipe or bleach	1 (2.5)
	Undisclosed	1 (2.5)
Total number of reported infectious conjunctivitis/keratitis, n (%)	0 (0.0)	
Total number of reported corneal abrasions, n (%)	0 (0.0)	

Table 2

Summary of the Experience of High Volume APRS Examiners Regarding the Preferred Disinfection Technique for Contact Wide-Field Fundus Camera and Incidence of Infection and Corneal Abrasions

No. of High Volume Examiners (>500 exams)	23
Preferred disinfection technique, n (%)	
Alcohol wipe	21 (91.3)
Bleach	1 (4.3)
Undisclosed	1 (4.3)
Total no. of reported infectious conjunctivitis/keratitis, n (%)	0 (0.0)
Total no. of reported corneal abrasions, n (%)	0 (0.0)