

Screening for Retinopathy of Prematurity in New Zealand

BY SHUAN DAI, MBBS, MS, FRANZCO

Retinopathy of prematurity (ROP) is one of the leading causes of preventable childhood blindness in developed countries, including New Zealand.¹ Treatment for vision-threatening ROP has been highly effective.^{2,3} Timely screening for severe ROP among at-risk infants is essential to prevent unnecessary visual loss associated with ROP.

SCREENING AND TREATMENT IN NEW ZEALAND

Retinopathy of prematurity screening for at-risk infants has been a practice since the early 1980s across neonatal intensive care units (NICUs) in New Zealand. The first formal New Zealand ROP screening guidelines were established in 1990.⁴ The guidelines recommend that all infants born weighing less than 1250 g or at less than 31 weeks gestational age undergo screening for ROP. A few tertiary neonatal intensive care units in New Zealand use the gestational age of equal to or less than 30 weeks as the entry criterion based on the low rates of severe ROP in their hospitals among infants born older than 30 weeks gestational age.⁵ ROP screening in the tertiary NICUs is performed largely by pediatric ophthalmologists, except in 2 tertiary NICUs, where retinal specialists perform ROP screening. ROP screening in most of the level-2 NICUs is performed by general ophthalmologists who have an interest in pediatric ophthalmology, and a few level-2 NICUs have either pediatric ophthalmologists or retinal specialists providing ROP screening. ROP treatment is available in all tertiary NICUs, and confluent diode laser photocoagulation is the preferred modality of treatment for ROP in New Zealand. Treatment criteria have evolved from treating threshold ROP in the Cryo-ROP era

to type 1 after the publication of recommendations of the ETROP study.³ ROP laser treatment usually is performed by pediatric ophthalmologists who perform ROP screenings or by retinal specialists in centers where a pediatric ophthalmologist is not available.

NEW TREATMENTS FOR RETINOPATHY OF PREMATUREITY

Intravitreal injections of anti-VEGF agents have significantly improved the outcome of posterior zone 1 ROP, particularly in the case of aggressive posterior ROP, where traditional laser treatment has higher failure rate.^{6,7} Our NICU was the first center in the Australasia region to use anti-VEGF injections for the treatment of severe zone 1 ROP. We have found that anti-VEGF agents are effective in achieving resolution of ROP in those cases treated with intravitreal bevacizumab (Avastin, Genentech).⁸ Strict guidelines must be followed in ROP case selection for the use of intravitreal bevacizumab, given the longer-term unknown potential systemic and ocular side effects. Only ROP cases that meet 1 of the following criteria are deemed appropriate for anti-VEGF treatment: (1) ROP that has failed to respond to adequate laser treatment; (2) cases in which laser treatment is not possible due to poor view of retina, or because the baby is too unwell to tolerate laser; (3) aggressive posterior ROP (APROP); and (4) type 1 ROP in zone 1.

CHALLENGES IN ROP MANAGEMENT AND POTENTIAL SOLUTIONS

According to the most recent survey through the Blind and Low Vision Education Network, ROP is the cause of severe vision loss in 7% of children in New Zealand.¹ The

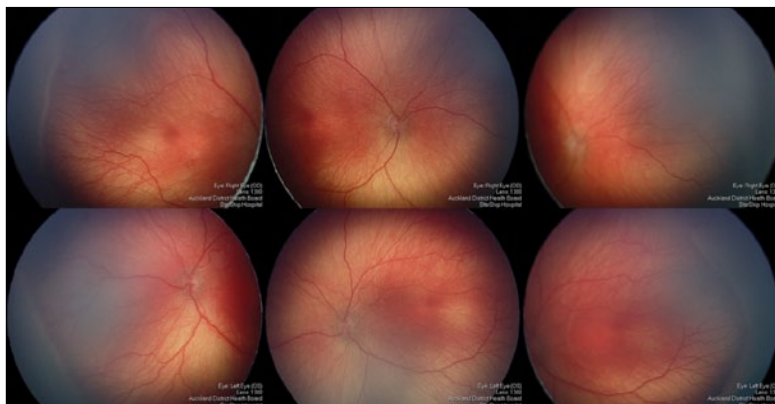


Figure 1. ARTROP Network Retcam ROP screening standard images.

major contributing factor for ROP-related visual loss in New Zealand is delayed diagnosis of severe ROP due to lack of timely screening. This is particularly the case in remote level-2 NICUs. Infants lost to follow-up screening after transfer from tertiary level NICU to level-2 NICU is another major contributing factor.

The introduction of the revised ROP screening guidelines, Retinopathy of Prematurity: New Zealand Recommendations for Case Detection and Treatment, which have been endorsed by both ophthalmologist and neonatologist communities in New Zealand, is likely to address these deficiencies through ROP screening service organization and action plans (unpublished data). An effective ROP screening service requires each NICU to have a unit-specific screening protocol with clearly defined responsibilities for each of the medical personal involved. According to the revised guidelines, each NICU should have an ROP nurse coordinator or neonatal charge nurse responsible for ROP screening. A record system must be established to automatically trigger and schedule the initial ROP examination for infants at risk. The revised guidelines specify detailed steps and responsibilities for both ophthalmologists and neonatologists involved in the care of the infants who require ongoing ROP screening while they are transferred between different NICUs.

It is the responsibility of the neonatologist to ensure that infants who are eligible for screening are scheduled on time for initial and follow-up ROP eye examinations.

It is the responsibility of the screening ophthalmologist to ensure that the initial ROP examination takes place at the time mutually agreed upon between the neonatologist and ophthalmologist. The examining ophthalmologist must record a follow-up screening plan in the infant's medical record and communicate this, as well as the outcome of the current examination, to the neonatology service coordinator on the same day.

The discharging NICU neonatologist must inform the

neonatologist in the receiving NICU of the requirement and timing of initial or follow-up ROP examination for infants transferred.

The nurse ROP coordinator or ROP charge nurse must ensure that a follow-up ROP examination is scheduled for infants who are discharged to home before completion of their ROP screening examination.

APPLICATION OF TELEMEDICINE IN ROP MANAGEMENT

As in other developed and developing countries, lack of available ophthalmolo-

gists for ROP screening is a problem in New Zealand, particularly in provincial areas where timely coverage for ROP screening can be difficult. Lack of sufficient experience in ROP diagnosis is another important issue facing many ophthalmologists in the remote level-2 NICUs, as often only 1 to 2 infants per month require ROP screening. An increase in ROP-related litigations against ophthalmologists has also made this bad situation worse.

Evolution of telemedicine for ROP screening opens a new frontier in ROP screening and has provided a potential solution to address the limitations faced in ROP screening.⁹ Widefield digital retinal imaging for ROP screening and diagnosis has been shown to be equally accurate as, or maybe even better than, the traditional binocular indirect ophthalmoscope ROP screening.¹⁰ Remote ROP screening using Retcam (Clarity Medical Systems) widefield digital retinal imaging that is captured by trained nurses or medical photographers and graded by ophthalmologists experienced in ROP screening has proved safe and effective.^{9,11}

ARTROP

The Auckland Regional Telemedicine ROP (ARTROP) network was established in 2006 and covers 4 NICUs including 2 level-2 centers, 1 level-3 center, and 1 quaternary NICU, providing ROP screening for almost half the infants eligible for ROP screening in the country. For more than 8 years, the ARTROP network has been using widefield retinal digital imaging for ROP screening across its entire network (Figure 1). Trained ROP specialist nurses perform imaging acquisition, and remote ROP grading is conducted by ophthalmologists specialized in ROP screening and treatment.

Retinopathy of prematurity follow-up screening or treatment directives are relayed to the NICUs electronically by emailing the digital ROP report. More than 1500 infants have been screened with no cases of severe ROP missed using this screening method. The sensitivity and specificity

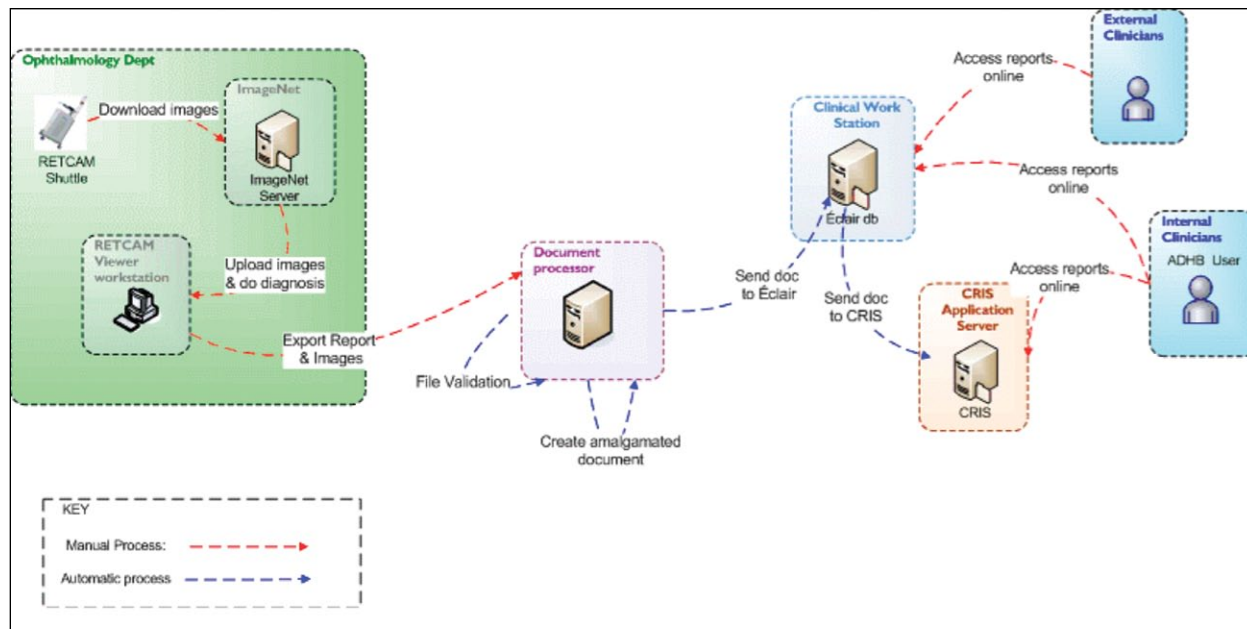


Figure 2. ARTROP Network ROP screening flow chart.

in detecting cases in which treatment is warranted has been 100%.¹²

Over the past 5 years, the ARTROP network has been integrated into the patient electronic medical record systems (Éclair, Sysmex) across all the hospitals in the greater Auckland region, and ROP screening and management reports, including critical ROP images, are available throughout the hospital electronic medical record network (Figure 2). Any physician involved in the care of the infant is able to access the ROP report from anywhere Internet access is available. The telemedicine ROP screening model has made the task of increasing parents' education and involvement in their children's ROP care easier and greatly improved the outcomes. The ARTROP experience provides valuable experience for ROP screening in New Zealand, and widefield imaging has been endorsed as an alternative to binocular indirect ophthalmoscopy and the preferred tool for ROP screening where Retcam is available. All level-3 NICUs except 1 (which is in the process of acquiring a Retcam) and one-third of level-2 NICUs, have access to a Retcam.

FUTURE POSSIBILITIES IN ROP CARE DELIVERY

Nurse-led ROP screening under the supervision of an ophthalmologist specialized in ROP care has proved safe and effective, further enhancing timely ROP screening where an ophthalmologist may not have been readily available or less experienced due to a small number of infants screened.¹³ Sharing technology and trained screeners among multiple NICUs may lower the initial

setup cost and provide overall better quality ROP screening. It is our hope that remote screening and centralized grading by ROP experts may become the reality in the future of ROP screening in New Zealand and beyond. ■

Shuan Dai, MBBS, MS, FRANZCO, is a Senior Consultant Pediatric Ophthalmologist in Starship Children's Hospital and Auckland City Hospital in Auckland, New Zealand. He is also the lead ophthalmologist in the ARTROP Network.



Dr. Dai states that he has no financial relationships to disclose. He may be reached at shuandai@me.com.

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