ROP prevention, screening and treatment programmes - progress update from Latin America

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Abstract

Retinopathy of prematurity (ROP) is the main cause of blindness and visual impairment in Latin America and prevention, detection and treatment have been a priority in the Region in the last two decades. There is progress in the number of eligible babies screened and treated in at least half of the countries with strong regulations on ROP, but screening is not yet available in all provinces in most. More effort is needed to increase national protocols and legislation, strengthening of services and human resources to cover all national provinces, telemedicine might be a promising strategy.

Introduction

Retinopathy of prematurity (ROP) is a major cause of blindness and visual impairment in children in Latin America being responsible for 16.6% of blindness in Chile, 11.8% in Sao Paulo, Brazil and 34.7% in Guadalajara, Mexico.[1-3] Studies from a number of countries of preterm infants with a birth weight of < 1,500 g, found the incidence of any stage ROP varied from 10% to 71%, and the incidence of treatable ROP varied from 1.2% to 19%.[4]

An earlier study in Latin America and the Caribbean showed that a higher proportion of eligible babies were screened in countries with government policies mandating and financing screening, which had clinical guidelines and where ROP was included in national health information systems.[5] In a worldwide survey of ROP, nine Latin American countries responded that they had national ROP protocols,[6] but information was not provided on the availability of ophthalmologists to screen, nor whether countries had a national ROP screening programme.

Methods

This paper summarizes the recent published data on the situation of ROP legislation, guidelines and programme development in Latin America. To obtain additional information, the Pan American Health Organization (PAHO) distributed a survey to national members of the Pan American Society of Retinopathy of Prematurity in all 19 countries in the region in 2018, to obtain information on the number of ophthalmologists performing diagnostic examination, the number of NICUs implementing ROP programmes at subnational level and the use of telemedicine in the screening.

Regional Response

The control of blindness from ROP has been a regional priority since the nineties when ROP was identified as an important cause blindness in children,[7] and was included in PAHO Action Plans for the Prevention of Blindness in 2009-2013[8] and 2014-2019.[9] Ministers of Health across the region approved these plans which are being implemented with support from PAHO, the International Agency for the Prevention of Blindness, international non-government organizations, worldwide experts and the Pan American Society of Retinopathy of Prematurity. In 2017, PAHO worked with a multi-disciplinary, international group to develop evidence-based guidelines for ROP to serve as a regional standard.[10]

National response

Normative

In the earlier study in ten Latin America countries, a higher proportion of eligible preterm newborns were being screened and treated in countries with (i) policies on financing mechanisms for screening and treatment, (ii) national ROP guidelines (iii) legislation mandating eye screening and (iv) management systems for data collection and analysis.[5] In Argentina, crucial factors which led to scaling up services for ROP included a dedicated group of professionals, the Ministry of Health, a national ROP committee, international cooperation for norms development and programme implementation, and external funding for a limited period of time.[11] Several countries in the region have national clinical guidelines which were developed using the GRADE methodology, in Argentina in 2016,[12] Mexico Ministry of Health in 2010[13] and Social Security in 2015[14.] Chile has an expert review guidelines,[15] whilst guidelines from Costa Rica, Cuba, El Salvador and Nicaragua exist but are not publicly available on the internet. The criteria for screening in these guidelines vary from <1,500 to <2,000 g, and from <32 to <34 weeks gestational age, and recommend screening preterm infants at any birth weight who have risk factors such as sepsis and transfusion of blood products.

Plans and Programmes

Nine of the nineteen countries collected and submitted the information requested in this survey whereas Chile and Argentina routinely collect data. In Chile, the programme is established in all

regions, and in eight provinces screening is by imaging and telemedicine with ophthalmologist readers, which has proved to be effective.[16] In Argentina in 2018, 114 neonatal intensive care units (NICUs), comprising most of the government sector, and 119 ophthalmologists have been implementing screening and treatment in all provinces since 2016.[17]

Over 60% of provinces/regions in Bolivia, Costa Rica and Nicaragua have at least one NICU doing ROP screening, and in about half of provinces/regions in Paraguay and Peru. El Salvador and Guatemala have less than 50% of provinces/regions implementing a programmme (Table 1).

Table 1. Policies mandating screening and provinces/regions with at least one hospital doing screening

Country	Policies mandating the exam or covering costs	Number of provinces/regions	Provinces/regions with screening (N, %)
Argentina	Yes	24	24 (100%)
Bolivia	No	9	6 (67%)
Chile	Yes	16	16 (100%)
Costa Rica	Yes	7	5 (71%)
El Salvador	Yes	14	5 (36%)
Guatemala	No	22	9 (41%)
Nicaragua	No	17	12 (71)
Paraguay	No	18	9 (50)
Peru	No	25	13 (52)

Nine countries had information on the number of NICUs with ROP screening and the number of ophthalmologists doing screening. The number of preterm babies per ophthalmologist screener varies and there is estimated to be one ophthalmologist per 108 preterm babies in Argentina and one per 250 preterm babies in Chile (Table 2). Both these countries have programmes which cover all provinces / regions, and Chile has a highly developed telemedicine program. In Guatemala there are estimated to be 474 babies per ophthalmologists doing screening, and if each baby is examined 3 times this would result in a workload of 27 preterm babies per ophthalmologists per week.. This workload would be

manageable if each ophthalmologist dedicates most of their time in ROP screening and treatment and if the babies are in very few large NICUs nearby, but this is rarely the case.

Table 2: Number of NICUs with ROP screening, number of ophthalmologists doing screening, number of eligible preterm babies per ophthalmologist doing screening

Country	NICUs w screening (N)	Ophthalmols screening (N)	Preterm births, 2015 (N)		Access to NICU (80%)	Survive NICU care (80%)	Eligible preterms/ screener (N)
			<37 wks[2]	<34 wks[3]			
Argentina[1]	114	119	60.900	20.097	16.078	12.862	108
Bolivia	9	10	22.100	7.293	5.834	4.668	467
Chile[1]	24	14	16.600	5.478	4.382	3.506	250
Costa Rica[1]	9	11	9.300	3.069	2.455	1.964	179
El Salvador	7	8	13.400	4.422	3.538	2.830	354
Guatemala	9	16	35.900	11.847	9.478	7.582	474
Nicaragua	14	18	11.100	3.663	2.930	2.344	130
Paraguay[1]	11	28	10.500	3.465	2.772	2.218	79
Peru[1]	31	35	45.700	15.081	12.065	9.652	276

1 Countries using digital imaging with remote reading
2 Preterm births in 2015 www.everywomaneverychild.org/wp.../Country-data-for-WPD-2016-Excel-doc.xlsx
3 33% estimate

A tele-education system for ROP was effective in improving the diagnostic accuracy and management of ROP by ophthalmologists-in-training in Mexico.[18]

Monitoring

The regional ROP guidelines recommend collecting data on the number of preterm newborns who are eligible for screening, the number examined, the number with ROP of any stage, the number with indications for treatment and number treated, to construct the following indicators, (1) coverage of screening, (2) proportion of preterm infants with any stage of ROP, and (3) treatment coverage for ROP.[10]

Since 2004 the national programme in Argentina has collected annual data and produces a report, with the indicators from 98 hospitals in 24 provinces reported in 2016. From 2004 to 2016, the mean birth

weight of newborns with any ROP decreased by 200 g and the mean GA reduced by 3 weeks. In addition, the proportion of babies treated for ROP with BW >1500 g or >32 weeks of gestational age was 30% in 2004, which rose to a peak of 40% in 2006 and progressively declined to 17 % (44/ 253) in 2016.[17] These changes almost certainly reflect improvements in neonatal care. Costa Rica has documented risk factors for ROP, and the results of ROP screening and treatment between 2010 and 2014,[19] and Colombia uses the national health information system (ASIS) to collect data on the number of live born babies with birth weight <1,999 g with a diagnosis of ROP; in 2014 it was 8.3%.[20] Some countries have assessed their ROP programme in a selected group of NICUs; in 7 units in Rio de Janeiro, Brazil in 2010 to identify the characteristics of preterm infants at risk of ROP,[21] in 6 units in Lima, Peru in 2012,[22] and in 32 units in Mexico in 2015. [23]

Comment

Latin America has experienced a strong regional direction, advocacy and support from international allies and experts, the Ministries of Health are introducing protocols and regulations and making important financial allocations for the incorporation of ROP services into neonatal care. Almost half of the countries have an inventory on the number of NCIUs and ophthalmologists implementing a ROP programme at the subnational level and are using telemedicine in the screening. Argentina and Chile have a national steering committee that plan and implement activities to strengthening services and human resources to cover all national provinces/regions and collect, analyses and uses data. The countries with less development in ROP programs would require developing protocols and regulations and stewardship for services and human resources development at the subnational level. Further research is needed on adherence to national or international guidelines in regions/provinces.

It is not possible to recommend the ideal number of ophthalmologists who should screen for ROP, as this is influenced not only by the number of preterm infants who survive but also by the distribution of NICUs and of ophthalmologists. Assuming each preterm infant needs an average of three examinations, the workload in terms of the number of preterm infants who need to be screened each week would very high in some countries in the region and more ophthalmologist need to be trained in

ROP screening. Much of this shortfall could be addressed by neonatology-led screening using wide-field imaging whereby members of the neonatal team take the images which are either interpreted by the team, which would require rigorous quality assurance systems, or are remotely interpreted by ROP experts. [24] Almost real-time image analysis using artificial intelligence is also on the horizon [25]. These advances in combination have great potential to increase access to high quality, reliable screening.

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