



IMPROVING NEONATAL CARE  
IN ARMENIA



BIRTHLINK REPORT





BirthLink gratefully acknowledges the enormous commitment and support that Ralph Yirikian has given over the last five years. Newborns throughout Armenia have benefitted from this project, and lives have been saved. Changes in practice now offer sick and preterm babies a better chance of survival, and a long and healthy family life.

*Kathy Mellor Founder and Director of BirthLink*

## 4 out of 5 newborn deaths preventable



- Every year one million babies die on the day they are born and nearly two million die within their first month.
- Globally, four out of five newborn deaths are preventable.
- In 2000, the United Nations established eight Millennium Development Goals.
- The 2015 target of MDG 4 is to reduce the mortality rate of children under five by two-thirds.
- While child mortality is falling, deaths in the first month of life have changed little.
- The first month, and particularly the first 24 hours, is the most dangerous in a child's life.
- Newborns now account for almost half of under-five deaths.

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## Armenian background

Following independence in 1991, which resulted in reduced government budgets for healthcare, the health and well-being of the general population suffered severely. This situation fuelled widespread voluntary payments for preferential health services, and as a result reinforced political and economic pressure to reform the health system. The new policy was to move away from a centralized command-and-control system, towards a decentralized regional system. The regional administrations monitor the care provided, while the

Ministry of Health formally retains regulatory functions. Most hospitals, pharmacies and medical equipment support facilities in Yerevan, the country's capital and largest city, have been privatised.

The neonatal services in Yerevan are mainly concentrated in six units, functioning as tertiary centres, plus another five maternity hospitals at secondary level. Most of the regional maternity hospitals function at Level 1, basic care. In addition, there are two children's hospitals caring for newborns requiring specialised care and surgery.

By the start of our programme in 2009, there was an urgent need for up-to-date equipment to support the care and treatment of sick newborns. Most of the neonatal units, particularly in the regions, had not been modernised and lacked basic facilities. There had been no specialised training for nurses caring for sick and preterm babies, and the number of neonatologists with expertise was extremely limited.

More than 50% of deliveries in Armenia took place in Yerevan. Frequently sick babies that could not be properly treated in the regions would be transferred to city hospitals. However, this was often too late to prevent either death or long term morbidity.



## The project



In 2008, an approach was made to Ralph Yirikian requesting support for a fund-raising photographic exhibition in Yerevan, which instead resulted in an offer of support to buy a neonatal intensive care cot. At the same time, a New Zealand company manufacturing neonatal equipment, agreed to help by offering Mr Yirikian – ‘buy one, get one free’. A deal was done, the two cots were duly delivered, and the programme to improve neonatal care in Armenia was under way. The company, Fisher & Paykel, have continued to honour this original offer, and to date we have purchased twelve cots and received a total of twenty-four.

Vivacell and BirthLink launched the project in September 2009, at a conference in the Medical University in Yerevan. The primary objective of the programme has been to reduce neonatal mortality throughout Armenia, through the provision of new equipment, improvement of neonatal facilities, and updating knowledge and education to the doctors and nurses working with babies. The commitment of the directors and staff of each hospital was key to achieving change, and so motivating and supporting the neonatal staff was paramount to the success of this project.

The project proved challenging because of the significant number of maternity departments in Armenia. There are ten maternity hospitals in Yerevan and a further 39 maternity departments in the regions.

While the city hospitals had better facilities, the regional units were in very poor condition with old unreliable equipment that was often not working. In addition, many of the health care providers lacked up-to-date knowledge and had limited practical experience.

The main causes of death after birth are prematurity, infection and birth asphyxia. With better care many deaths from these causes are preventable, so we provided essential equipment for safely managing a sick or premature baby following delivery. This included infant warming devices, equipment for delivering small volumes of intravenous fluid, non-invasive respiratory support systems and oxygen monitoring.

During 2009, we started working with the ten departments in Yerevan, as well as the University Children’s hospital. This hospital takes many babies with complications, both from the regions as well as the local Yerevan maternity departments.



# Supporting Yerevan and the regions

## REGIONS SUPPORTED

**SYUNIK** Kapan, Goris, Sisian

**VAYOTS DZOR** Vayk

**ARARAT** Vedi, Artashat

**GEGHARKUNIK** Vardenis  
Gavar, Martuni, Sevan  
Chambarak

**TAVUSH** Ijevan, Berd  
Noyemberian, Dilijan

**LORI** Alaverdi, Tashir  
Stepanavan, Spitak

**SHIRAK** Artik, Maralik  
Gyumri x 2 hospitals

Over the last five years this project has supported all ten maternity hospitals in Yerevan, and the neonatal departments in two children's hospitals.

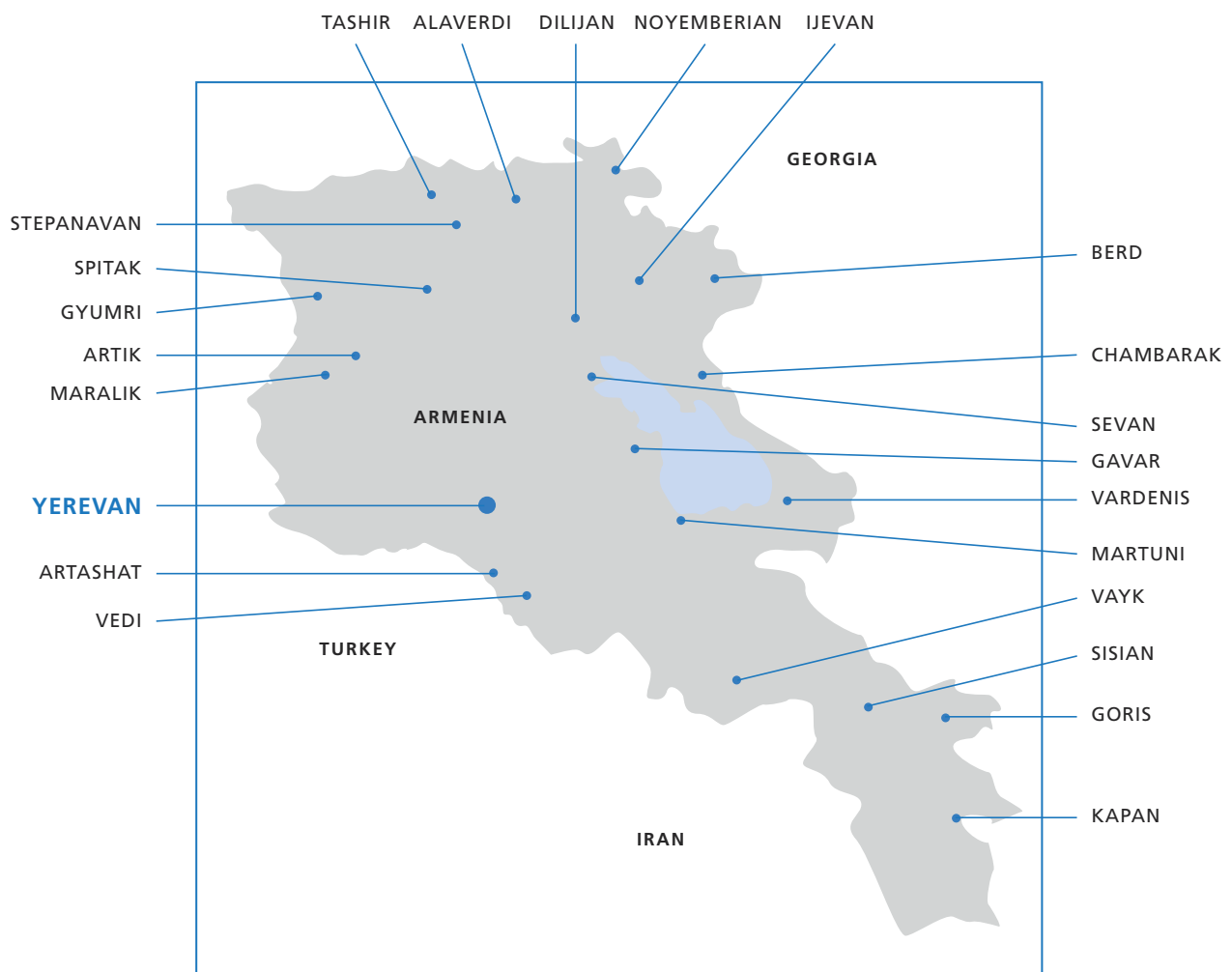
**2009** We started working with the ten departments in Yerevan, as well as the University Children's hospital. This hospital takes many babies with complications requiring specialised care and the expertise of experienced pediatricians and neonatologists.

**2010** The project was extended to include the regions, but also included the supply of additional equipment for the tertiary centres in Yerevan. Seven hospitals in four regions were included, specifically chosen because of their remote location and distance from Yerevan.

**2011** A further three hospitals in the regions and a second children's hospital in Yerevan were included, together with additional equipment, again to the main centres.

**2012** The emphasis was once more on the regions and we included a further ten hospitals covering three specific areas.

**2013** Four hospitals in three regions were supported this year, and a new respiratory therapy was launched in Yerevan and distributed to ten hospitals.



## Equipment



With the highest mortality for newborns occurring on the first day of life, the project has concentrated on providing equipment for immediate treatment of the baby requiring intensive care.

Therefore we have supplied equipment to maintain warmth, non-invasive respiratory therapies, oxygen monitoring, delivery of small volumes of intravenous fluids and phototherapy for the management of jaundice.

This has enabled any regional unit to stabilize a baby and care safely and appropriately in the first twenty-four hours. Such babies need good immediate care to prevent complications and long-term morbidity, before being transferred to a tertiary unit in Yerevan for ongoing care.

Hypothermia in newborns has a significant effect on mortality and morbidity, including worsening respiratory complications and low blood glucose, resulting in developmental problems. This should be routine basic care for newborns, and our project has concentrated on this immediate period after birth.



In addition, we have provided more advanced equipment for the tertiary centres in Yerevan, where the majority of sick babies will be cared for. This includes mechanical ventilators to support breathing, blood analysis for the measurement of jaundice, and non-invasive respiratory support systems.

In 2009, we introduced nasal CPAP – a respiratory support system for preterm babies to improve lung compliance. Despite this being available in Europe and the US for more than fifteen years, CPAP was previously not available in Armenia. BirthLink, together with Fisher & Paykel, developed a method which could be used in countries where a centralised medical gas supply is not always available. Following on from this therapy, a further development in this field has resulted in an additional therapy – Nasal High Flow. This is a much newer treatment but is proving very effective for some babies with breathing difficulties, and it is much easier to deliver. BirthLink launched this system in Yerevan in November 2013, and to date has provided the equipment to ten hospitals.

Following a request from one neonatologist, in 2010 we purchased an ultrasound machine for cranial ultrasound imaging in newborn babies. Most importantly the machine is portable which allows the operator to conduct the scan at the bedside. This had also not been previously available, and babies had to be transferred to a centre, which is impossible for very sick babies. This is now recognised as a standard piece of equipment for management and diagnosis of neurological problems after birth.



## Training and education

Ever since our agreement started in 2008, training on all new equipment, along with support and education for the doctors and nurses, has been an essential factor for the success of the project.

As part of this process we have held four annual conferences in Yerevan. Up to one hundred participants have attended for the one to two day conferences. The programme has included formal presentations as well as practical training and small workshops. The UK speakers participating are experts in neonatology, and the topics have included all relevant management of sick and premature babies, particularly targeting the immediate care of the compromised baby after birth.

In addition, a number of small workshops have been held where new therapies and equipment are introduced. Particular attention has been paid to the respiratory therapy we have installed over the last five years.

During installation of equipment at each hospital, one-to-one training takes place on site, and ongoing support is provided by our partners in



Yerevan – neonatologists who we have been working with us since BirthLink's launch, and now have extensive experience on all the equipment and management of the babies.

For some of the regional hospitals, staff are encouraged to spend a week in one of the tertiary centres in Yerevan, to gain more knowledge and update their skills. Monitoring in the regional hospitals continued throughout the project, and extra visits made as and when requested.

Since 2012, Yerevan State Medical University, under the direction of Pavel Mazmanyanyan, has conducted courses for neonatologists and nurses, including:

- Use and update of equipment in neonatal practice
- Basic course on respiratory therapy of newborns
- Nursing care of sick and premature newborns

This education is vital for improving practice and saving newborn lives.



## Progress data

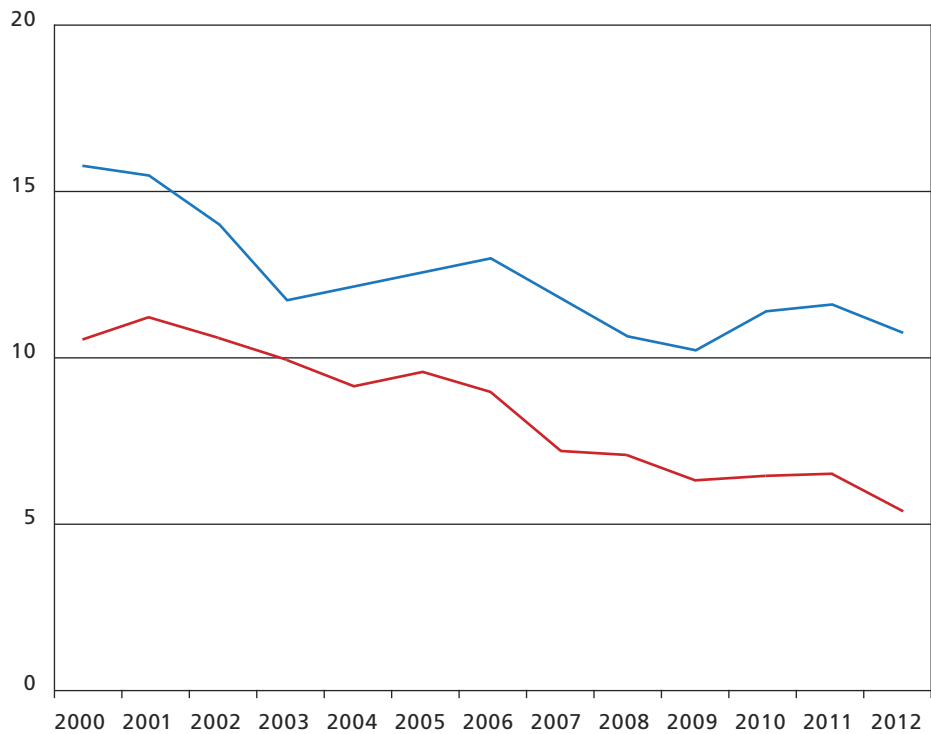
Early neonatal mortality represents all deaths occurring in the first week of life, and the time when most neonatal deaths occur.

This graph represents infant and early neonatal deaths per thousand live births.

A reduction in early mortality from 10.7/1000 in 2000 to 5.4/1000 in 2012 is very positive, but more detailed outcomes and long-term morbidity needs to be collated alongside this data.

Most of these deaths are occurring in the main neonatal departments in Yerevan, as sick babies are transferred from the regions to Yerevan for continuing care as soon as possible.

■ Infant deaths per 1000 live births  
■ Early neonatal deaths per 1000 live births



Source: WHO/Europe, European HFA Database, April 2014

## Percentage of babies screened for ROP requiring laser treatment

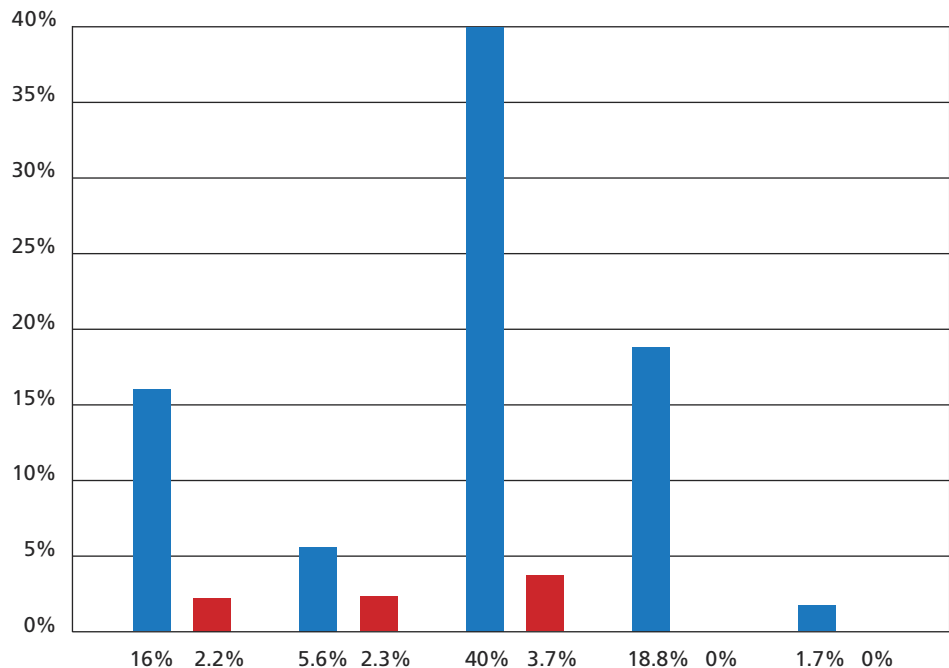
In the five main neonatal centres where most small, at-risk babies are cared for, there has been a significant reduction of babies requiring laser treatment, and screening is now carried out on all babies at risk, according to international guidelines.

In the first year 11.7% of babies screened needed laser treatment, compared to 1.9% in the second year.

This is the result of better monitoring, and equipment that can deliver less than 100% oxygen.

### FIVE NEONATAL CENTRES

■ JULY 2010-2011  
■ JULY 2011-2012



Source: The Armenian Eye Care Project

Too much oxygen given to small, premature babies can cause damage to the retina resulting in visual impairment or total blindness. To minimise this, all vulnerable babies should have their oxygen levels continuously monitored while receiving respiratory support.

As part of this project, equipment has been supplied to all neonatal departments, not only to monitor babies' oxygen levels, but also provide equipment that delivers a safer combination of air and oxygen during respiratory support. A screening programme started in 2010, identifies babies developing this condition, and allows laser treatment to take place to halt the progression of the disease.





# Summary and the future



The primary objective of this project has been to reduce neonatal mortality in Armenia. Current available data shows early neonatal mortality rate declining, with the latest figures at 5.4/1000 live births, compared to 10.2/1000 in 2000.

The project has made a difference and changed practice in a number of ways, particularly with the management of respiratory disorders in both term and premature babies.

## Our key achievements

- Introduction of non-invasive respiratory support – CPAP
- High Flow therapy introduced in 2013
- Bedside cranial ultrasound imaging for newborns
- Supporting neonatal research
- Contributing to the decline in early neonatal mortality
- Reduction in visual impairment following neonatal intensive care

As a result of both the new respiratory therapies and the availability of bedside ultrasound scanning, the work has been presented at two international conferences:

June 2013 11th World Congress of Perinatal Medicine Russia

October 2013 European Society for Paediatric Research Portugal



## Looking forward

BirthLink has been very fortunate to be working in partnership with Associate Professor Pavel Mazmanyán. His vision for developing and improving care for these vulnerable babies has been paramount in changing practice, and as a result of his position in Yerevan State Medical University since 2011, the future is looking good.

- In 2011, the department (faculty) of neonatology was established in Yerevan State Medical University, headed by Dr Pavel Mazmanyán.
- This department is engaged in postgraduate and continuing medical education.
- The main objective of the department is to prepare qualified medical professionals for working in perinatal centres, and maternity and children's hospitals throughout Armenia.
- The curriculum has been developed according to international standards for neonatal training.
- There is also a seven week refresher course for neonatologists.

BirthLink will continue to support Armenia, and there will be ongoing co-operation between the Medical University, Imperial College in London and BirthLink.



## Finance

	2009	2010	2011	2012	2013
<b>FUNDS</b>					
Grant	£260,000	£121,157	£102,365	£101,495	£70,700
<b>EXPENDITURE</b>					
Equipment	£232,233	£108,580	£94,024	£81,671	£54,544
Implementation	£19,927	£14,577	£8,341	£19,824	£16,156
Conference	£7,840	£2,000			
<b>TOTAL</b>	<b>£260,000</b>	<b>£125,157</b>	<b>£102,365</b>	<b>£101,495</b>	<b>£70,700</b>



The majority of the grant goes towards buying new, high-quality neonatal equipment. This equipment needs to deliver safe and effective treatment and care for newborn babies. It is essential that the equipment is reliable with minimal maintenance to ensure long-term use and sustainability.

The implementation costs cover flights, car rental, and accommodation of all UK participants involved in delivering this project, including experts in neonatology. All UK doctors and nurses make these visits voluntarily in their holidays, and continue to support Armenian neonatologists throughout the year.

Insurance, movement of freight, and storage in preparation for shipment, are included in the implementation costs. The United Armenian Fund supports our operation through handling the shipping arrangements and preparation of the necessary documentation. Since 2012, we are required to make a donation to UAF towards the costs of shipping.

Experienced technicians travel from the UK to build the medical equipment and give hands-on training to staff during installation. On-going maintenance, and the provision of some consumables, is also included within these costs.

Since 2010, we have been very fortunate to have funding from the UK division of Danone Nutrition to arrange and manage four annual neonatal conferences.



# BirthLink Neonatal Team



Dr Cath Harrison  
Neonatologist – UK



Nick Connolly  
General Manager UK –  
Fisher & Paykel



Chris Fearn  
Neonatal Nurse Specialist – UK



Dr Eduard Kagramanian  
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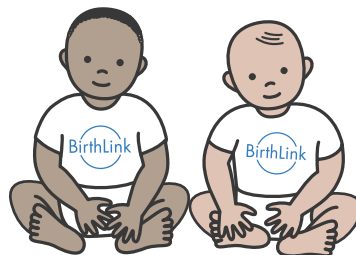


Paul Mellor  
BirthLink Trustee  
Photographer





[www.birthlinkuk.org](http://www.birthlinkuk.org)



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