

## The Armenian SORT IT Course

# Free hospitalization for acute respiratory infections in children: what effect and how much does it cost for Armenia?

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### Abstract

**Introduction:** The “Child Certificate” program, launched in Armenia in 2011, made hospitalization for children less than seven years free in order to improve access to hospitalization, reduce out-of-pocket expenses and ensure Universal Health Coverage. We aimed to estimate trends in the number of outpatient and hospitalized acute respiratory infection (ARI) cases and related under-five mortality.

**Methodology:** Cross-sectional study using data from national databases before (2008-2011) and after (2012-2017) Program implementation. The diagnosis of ARI was based on the International Classification of Disease (ICD-10).

**Results:** The average hospitalization per 1000 children under 14 and infants increased by 85% and 75% respectively, compared with the period before the introduction of the Program, while the frequency of outpatient visits remained unchanged. The ARI-related mortality in children less than five years and in infants decreased by 11% and 19%, respectively. Financial allocations for ARI-associated hospitalizations amounted to 2.1 billion Armenian drams in 2011 and increased to 3.3 billion drams in 2016 (an increase of 57%). For pneumonia, this increase was 108% (from 0.35 to 0.72 billion).

**Conclusions:** The introduction of free hospitalization for ARI led to an increase in the hospitalization rates. There was a favorable decline in under-five mortality and an exponential increase in financial allocations. The reasons for hospitalization should be investigated to ensure rational hospitalization with parallel improvement of primary care to reduce delayed presentations. It is necessary to find ways addressing the growing financial allocations for ARI-associated hospitalization.

**Key words:** morbidity; mortality; health system; SDGs; universal health coverage; SORT IT.

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### Introduction

In 2015, the international community embraced the Sustainable Development Goals (SDGs), the Goal 3 of which includes universal health coverage (UHC) and reducing morbidity and mortality of children less than five years (under-five children) [1]. One of the SDG targets is to reduce the under-five mortality rate to 25 per 1,000 live births by 2030.

Acute respiratory infections (ARI) including pneumonia are common killers of under-five children in many low and middle-income countries. According to the World Health Organization (WHO), about 5.6 million under-five children died in 2016 with 13% due

to pneumonia, and more than 95% in developing countries [2]. On average, incidence of ARI is about 5 episodes per child per year among [3]. The reasons behind these high ARI morbidity and mortality include socio-economic factors such as poverty, undernutrition, and barriers to accessing healthcare services [4].

The ARI remain a major public health priority in Armenia being responsible for at least one of seven deaths among under-five children. It ranks number one among the reasons for hospitalization of under-five children [5]. In 2011, the Ministry of Health of Armenia (MoH) launched the “Child Certificate” program which included the introduction of “free care” for under-seven

children needing hospitalization for all conditions including ARI [6]. The primary intent was to reduce mortality by facilitating access to care through the elimination of common out-of-pocket and other payments (for drugs, supplies) at health facility level.

Introduction of “free care” in 2011 was followed by increased hospital admissions and financial allocation from 3.1 billion Armenian drams (approximately 8.5 million US\$) in 2010 to 6.4 billion drams (approx. 17.6 million US\$) in 2011 [7,8]. Improved access to hospital admissions (country-wide in Armenia) might have also had a beneficial impact on under-five ARI mortality. These parameters are yet to be studied in Armenia, and a PubMed search revealed no publications from the region (East Europe and Central Asia) on the health system effects (attendance rates, hospitalization rates and under-five/infant mortality), as well as on financial allocations of free hospitalization for ARI.

Since countries like Armenia make efforts to achieve the SDGs, the UHC and financial risk protection, such information would be vital to revising policies, orienting current efforts and ensuring that the “required funding” is not left out from the planning process.

In this study we aimed to assess the health system effects and financial implications of introducing free hospitalization care for ARI in under-seven children. We assessed the trends in: a) the number of outpatient and hospitalized ARI cases and b) ARI-related under-five mortality. We also assessed the evolution of financial allocations for ARI-related hospitalization in the period after introducing free care.

## **Methodology**

### *Study Design*

Cross-sectional study using country-wide data from national databases before (2008-2011) and after (2012-2017) implementation of the “free care” program.

### *Study Setting*

Armenia is a country in the Transcaucasia with a population of about three million. It borders with Turkey in the west, Georgia in the north, Azerbaijan in the east, and Iran and Azerbaijan in the south. There are 11 regions (marzes) including the capital city, Yerevan. The geography is diverse including plains, valleys, hills and high mountains. Armenia was considered a lower-middle income country, but since July 1<sup>st</sup>, 2018 [9] the World Bank has reclassified the country’s status to upper-income. However, one third of population still lives in poverty [10].

### *Child health services in Armenia*

At primary healthcare (PHC) level, child health services are integrated and provided through a tiered system comprising of a network of health posts with nurses in small villages, health centers with family doctors in larger villages and out-patient “polyclinics” with either family doctors or general pediatricians in cities. A doctor serves a defined pediatric population of 600 to 1,200 children (less than 18 years). Hospital care is available at district and regional centers while most specialized hospitals are concentrated in the capital city of Yerevan. A child can be admitted to hospital either through referral from PHCs or directly after presentation to any given hospital. The final decision for admission is clinician-related.

According to the National Statistical Service, the under-five mortality in the early 90s was about 20 per 1,000 live births, and it gradually declined to 10 per 1000 by 2017 [5]. This is mainly the result of programs implemented in collaboration with WHO and UNICEF, such as Integrated Management of Childhood Illnesses (IMCI), promotion of breastfeeding, introduction of HiB and pneumococcal vaccinations, improvement of neonatal care [11].

### *Healthcare financing and introduction of free hospitalization*

Since the mid 2000’s, the financing of primary health care has stagnated, as has the salary level of healthcare providers. This negatively affected their motivation, which led to the depletion of public healthcare facilities and the restriction of the influx of new doctors. The PHC is offered free-of-charge in Armenia. In theory, inpatient care was also considered “free”, but limited to low levels of health care financing. Thus, as in other countries in the region, informal payments to health workers and for hospital services became commonplace to maintain the viability of the system. In addition, patients often had to make additional payments for medicines and supplies. A study showed that 91% of patients receiving hospital care in Armenia made informal payments [12]. This could adversely affect access to inpatient treatment and care-seeking behavior in the country.

The 2011 launch of the national program “Child Certificate” through increased Government funding of hospital care services became a new milestone. Thanks to this Program, children less than seven years and groups such as socially vulnerable families and orphans were entitled to free inpatient treatment. Salaries of hospital staff were also raised and monitoring systems were established to prevent informal payments in

**Table 1.** Ambulatory visits and hospitalizations in children with Acute Respiratory Infections (ARI) in all health facilities before (2008-2010) and after introduction of free hospitalization in Armenia.

Acute Respiratory Infections (ARI) cases per 1000 children	Before free hospitalization					Free hospitalization				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Ambulatory cases (< 14 years)	227	311	292	279	275	288	277	263	286	288
Hospitalizations (< 14 years)	23	26	29	35	33	44	52	51	68	53
Hospitalizations (< 1 year)	112	131	158	165	185	213	240	244	304	280

hospitals. This led to the virtual elimination of informal payments for pediatric hospital care [13]. Hospitals subsequently received a defined amount of money for each admitted child, which varied depending on the type and severity of the cases and the hospital stay.

#### *Study population and period*

The study population included children with ARI diagnosed according to the WHO 10<sup>th</sup> International Classification of Diseases (ICD-10): J00-J06 (upper acute respiratory infections); J12-J18 (pneumonias); J20-J22 (acute bronchitis and bronchiolitis). Evaluation of trends in morbidity and hospitalization included children under the age of 14 years, while mortality rates were estimated only for under-five children. The study covered the period from 2008 to 2017 (three years before and seven years after the implementation of the Program).

#### *Data collection, sources and statistical analysis*

Data was sourced from national databases including: a) National Statistical Service (NSS) for mortality cases in under-five children; b) National Health Information System (NHIS) for morbidity and hospitalization in under-fourteens; c) Health State Agency (HSA) on financing of hospital cases for under-seven children. The databases and mechanisms for data collection, validation and reporting in the NSS and NHIS remained the same during the entire period of the study. Information from the HSA after 2010 was available. Data were exported to Microsoft Excel for descriptive analysis and reported using proportions, tables, and figures.

#### *Ethics approval*

The study was approved by the institutional Ethics Review Board of Center of Medical Genetics and Primary Health Care, Yerevan, Armenia.

## **Results**

#### *Ambulatory visits and hospitalizations for ARIs before and after introduction of free hospitalization*

Table 1 shows the numbers of outpatient visits and hospitalizations in children less than 14 years old with ARI in all health facilities before (2008-2010) and after (2011-2016) introduction of free hospitalizations in Armenia.

The average rate of ambulatory consultations per 1,000 before (277) and after (279) introduction of free hospitalizations was similar. However, average hospitalizations of under-fourteens per 1,000 increased significantly by 85% (48/1,000) compared with the prior period (26/1,000). This increase was most pronounced (119%) in the last three years (2015-2017) after introduction of free hospitalization program.

For infants (less than 1 year), there was a similar increase by 75% in average hospitalizations per 1,000 infants after introducing free hospitalization (233/1,000) compared with the prior period (133/1,000; Figure 1). Here again, the increase became pronounced in the last three years.

#### *ARI-related mortality in under-five children before and after introduction of free hospitalization*

After introduction of free hospitalizations, the average ARI-mortality rate among under-five children reduced by 11% (1.6/1,000) compared with the prior period (1.8/1,000; Table 2).

**Table 2.** Acute Respiratory Infections- (ARI) related mortality in under-five children before (2008-2010) and after introduction of free hospitalization in Armenia.

ARI-related mortality per 1000 children	Before free hospitalization					Free hospitalization				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Under 5 years	1.7	1.7	2.1	2.1	2.1	1.6	1.2	1.5	1.4	1.4
Under 1 year	1.5	1.4	1.8	1.7	1.8	1.2	0.9	1.3	1.1	1.1

For infants, this reduction was more pronounced: 19% (1.3/1,000) compared to the prior period (1.6/1,000; Figure 1). Mortality reductions in both age groups became marked in the last three years (22% in under-fives and 27% for infants).

*Trends in financial allocations for ARI-related hospitalization after introducing free hospitalization*

Table 3 shows the trends in financial allocation after introducing free hospitalizations. Financial allocation for all types of ARI hospitalizations was 2.1 billion Armenian drams in 2011 which increased to 3.3 billion in 2016 (a 57% increase; Figure1). For pneumonia this increase was 108% (from 0.35 to 0.72 billion Armenian drams).

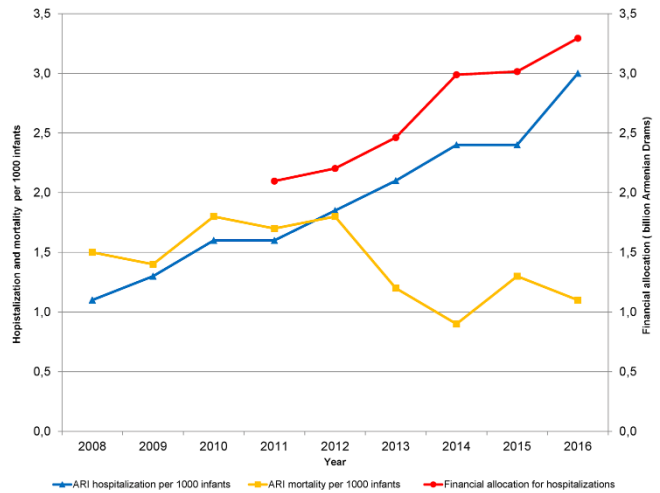
Between 2011 and 2016, the financial allocation for pneumonia ranged between 17% and 22% of total ARI financial allocations.

**Discussion**

This is the first study from the EECA region that assessed the healthcare system and financial effects of offering free hospitalization for ARI. It showed that after the introduction of free hospitalization, the average hospitalization increased considerably (85% among children less than 14 years old and 75% in infants), while mortality before the age of five decreased by 11% and infant mortality by 19%. Financial allocations for ARI-associated hospitalizations increased exponentially. On the contrary, outpatient visits remained the same before and after the introduction of free medical care.

These findings have important public health significance. The reduction in mortality translated to roughly 11 saved lives per 100 under-five children who had previously died of ARI and 19 saved lives per 100 infants. This is laudable and is in line with efforts to achieve the SDG goal 3 on reducing childhood mortality in Armenia. A down-side of the findings is the sustainability concern of progressively increasing allocations for ARI hospitalizations in a country that has one of the lowest per-capita allocations for healthcare in the region.

**Figure 1.** ARI mortality and hospitalizations per 1000 infants and financial allocations for hospital treatment of ARIs in Armenia.



The strengths of this study were as follows: it was country-wide and included a before-and-after comparison; ICD definitions were used for all ARI diagnosis and thus harmonized; attendance and mortality rates were standardized for age allowing comparisons and; the national mechanisms for data collection and reporting during the entire study period remained similar allowing trend assessments. We also adhered to the STROBE guidelines for reporting of observational studies [14].

Limitations of the study included the fact that we used aggregate data that did not allow us to assess the justification of free hospitalizations. Furthermore, the NSS and NHIS databases provide stratified data only for the hospitalization of one of the ARI (pneumonia), while more information on other specific ARI conditions would be useful. This issue is already being addressed by the MoH, and the databases are being adapted accordingly.

**Conclusion**

The study findings have a number of implications for policy and practice. First, it is necessary to investigate the reasons behind the considerable increase in hospitalization that are observed after the

**Table 3.** Trends in financial allocations for hospitalizations for Acute Respiratory Infection (ARI) in children after introduction of free hospitalization in Armenia.

Allocations*	Year					
	2011	2012	2013	2014	2015	2016
ARI hospitalization (all types)	2.097	2.203	2.462	2.988	3.015	3.294
Pneumonia hospitalization	0.348	0.404	0.536	0.598	0.608	0.722

\* In billions of Armenian Drams.

introduction of free inpatient care for ARI. The increase is likely linked to quality of practices at PHC level and elimination of out-of-pocket expenses from informal payments at health facilities and consequently, the improvement in access to hospitalized care for children with severe ARIs. This would also logically explain the favorable reductions in under-five and infant mortality at population level. These aspects merit further qualitative research.

Secondly, the progressive increase in financial allocations for ARI is concerning as it may be unsustainable over time. In 2011, the total financial allocation for hospitalizations in children was about six billion Armenian drams, of which about two billion was allocated to ARI. Over about 5 years, allocations for “all ARI” increased by 57%, whereas for pneumonia approximately doubled (108%). If this trend continues, the entire healthcare budget will need to be doubled or tripled in the next five years. A key question is “*Where will the money come from?*”.

Introducing measures to ensure rational hospital admissions and introducing upstream interventions for improving PHC so that children with ARI are managed early may limit the hospitalization load and save money. The guidelines and regulations including IMCI need to be reviewed and effectively adapted to the Armenian context and implemented for both outpatient and inpatient care. The government of Armenia has also recently introduced preventive pneumococcal vaccinations for children, which should have a beneficial effect on the incidence of severe pneumonia. These measures would need to be coupled with perspectives on how to increase and sustain funding.

In conclusion, the introduction of free hospitalization for ARI in Armenia led to an increased hospitalization rate with a favorable decrease in the infant and under-five mortality. Efficient ways should be found to address the growing financial allocations for ARI-related hospitalization.

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