

A young boy with short brown hair, wearing a bright green hooded sweatshirt, is shown in profile from the waist up. He is blowing a stream of colorful bubbles. The background is a warm, out-of-focus brown with many small, glowing light spots (bokeh). The title text is overlaid on the upper right portion of the image.

# II JORNADA SOBRE BRONQUIOLITIS EN ESPAÑA

La mejora de la salud infantil mediante acciones de salud pública.  
Ministerio de Sanidad, Servicios Sociales e Igualdad.  
Madrid, 26 de septiembre de 2014

# II JORNADA SOBRE BRONQUIOLITIS EN ESPAÑA

## Bronquiolitis y el Corazón del Niño

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# INFECCIONES POR VRS: Relevancia

*Global burden of acute lower respiratory infections due to respiratory syncytial virus in young children: a systematic review and meta-analysis.*

## Findings

In 2005, an estimated 33·8 (95% CI 19·3–46·2) million new episodes of RSV-associated ALRI occurred worldwide in children younger than 5 years (22% of ALRI episodes), with at least 3·4 (2·8–4·3) million episodes representing severe RSV-associated ALRI necessitating hospital admission. We estimated that 66 000–199 000 children younger than 5 years died from RSV-associated ALRI in 2005, with 99% of these deaths occurring in developing countries. Incidence and mortality can vary substantially from year to year in any one setting.

Nair H, et al.  
Lancet.  
2010; 375:  
1545–55.

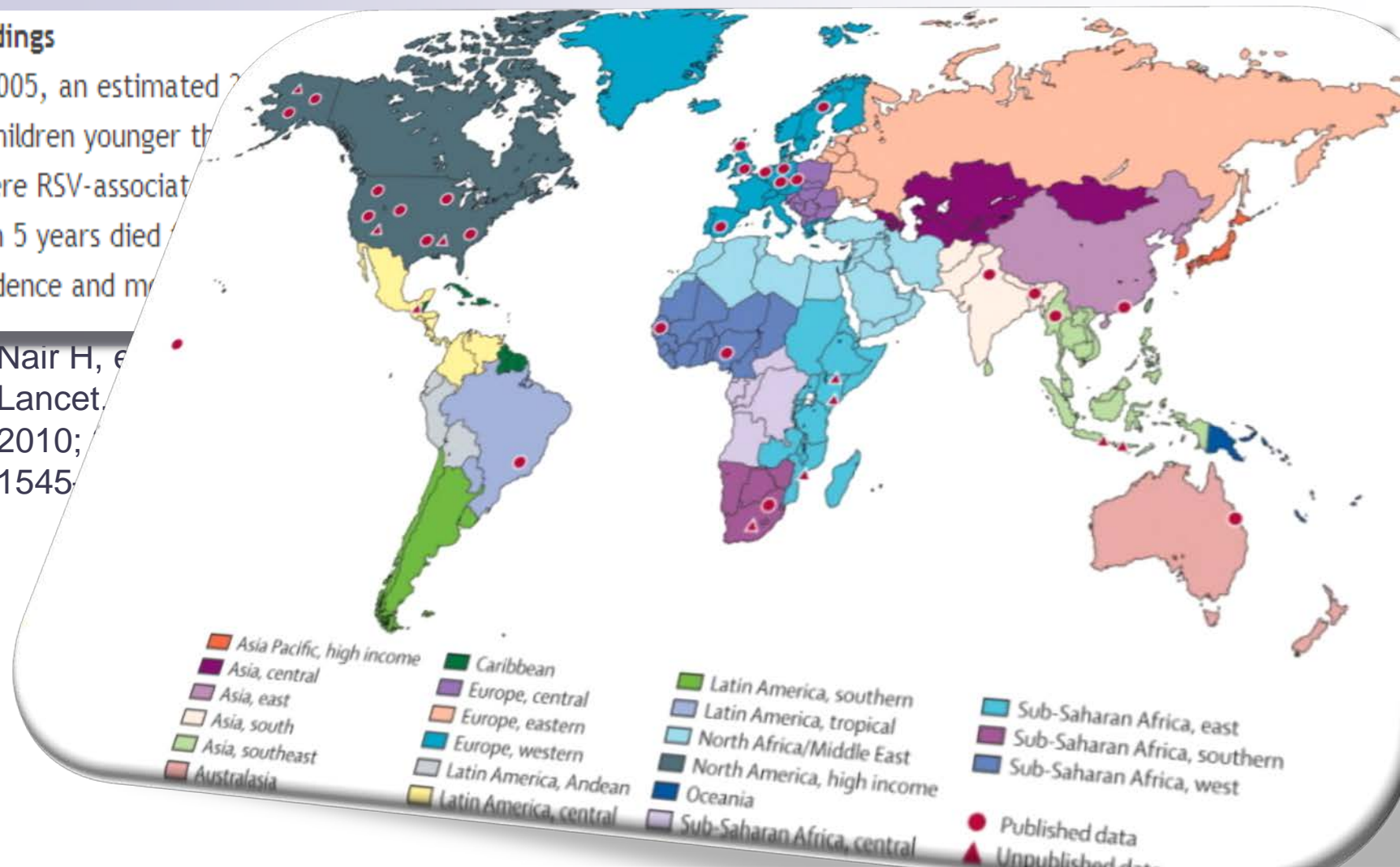
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# CARDIOPATÍAS EN LA INFANCIA: Relevancia

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Cardiopatías Congénitas: Primera causa de anomalías  
1 de cada 100 recién nacidos

Cirugía cardíaca infantil, cateterismos intervencionistas:

Alta tecnología, costes hospitalarios

Buenos resultados: mortalidad baja, morbilidad

Ingresos en Unidades de Cuidado Intensivo

Pediátrico: junto a infecciones respiratorias

Neonatal: junto a prematuros

Otras cardiopatías (Miocardiopatías, Arritmias):

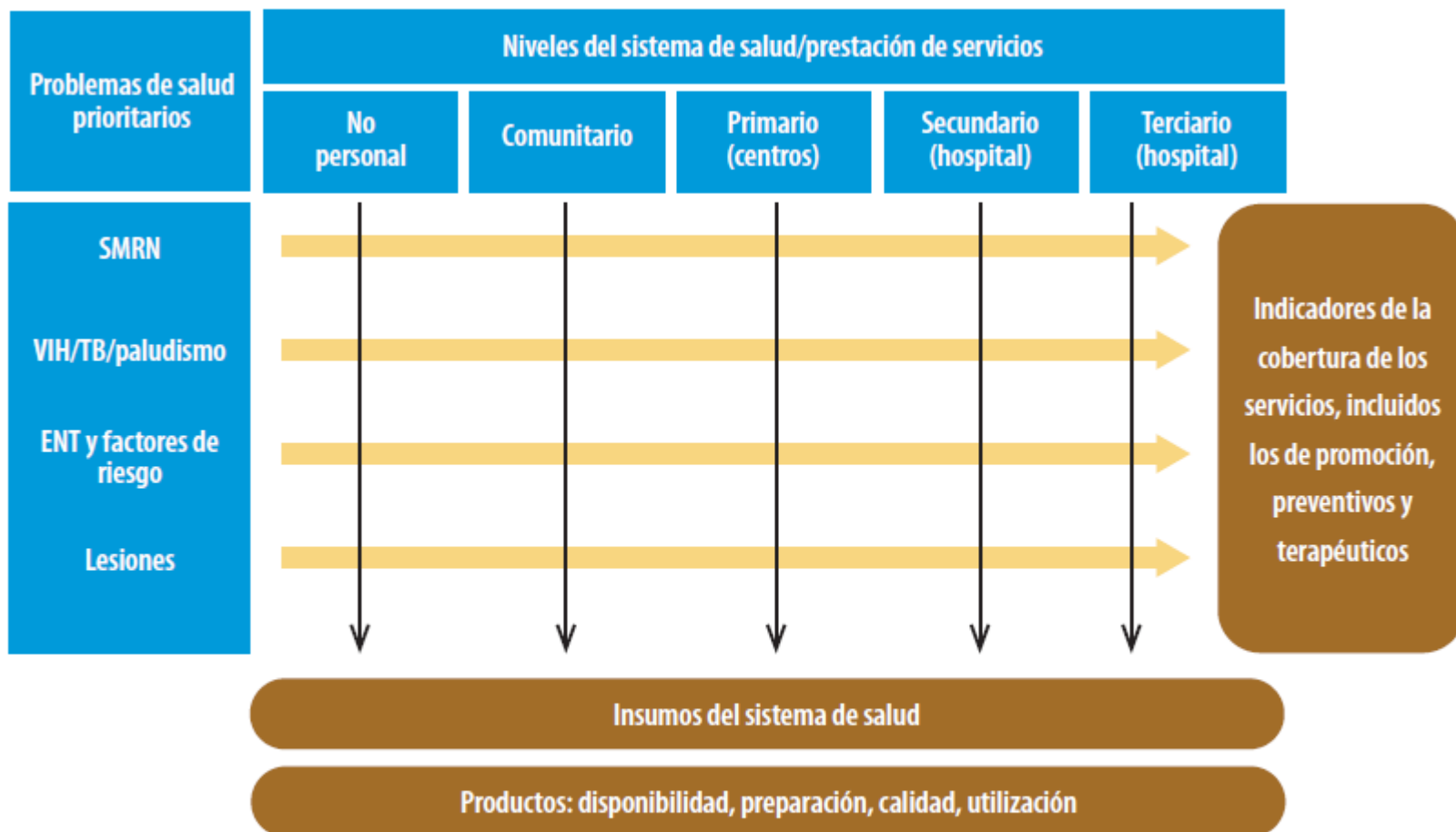
Alto impacto socio-sanitario

Muerte súbita, trasplantes



# ATENCIÓN DEL NIÑO CON CARDIOPATÍA DISTINTOS NIVELES

**Figura 1.4.** Marco para la medición y el seguimiento de la cobertura de los servicios de salud



VIH: virus de la inmunodeficiencia humana. SMRN: \_salud de la madre, el recién nacido y el niño. ENT: enfermedades no transmisibles. TB: tuberculosis.

Nota: Los servicios de salud «no personales» son acciones dirigidas a las comunidades o a la población en general —como campañas masivas de educación sanitaria, elaboración de políticas o medidas fiscales—, o bien a componentes no humanos del medio ambiente —como las medidas de salud ambiental.



# INFECCIÓN POR VRS - BRONQUIOLITIS EN CARDIOLOGÍA PEDIÁTRICA CLAVES Y REPERCUSIÓN



# Vulnerabilidad por VRS en Cardiología: Datos Históricos

Children with  
heart disease < 24 m/o

RSV Bronchiolitis

Hospital admission x 2-6 others

Severity 33% ICU, 18% MV

Mortality 2.5-3.4% (up to 37%)

High risk of pulmonary HT

Myocardial Injury

Delay and interference in  
interventions

Scheduled surgery delays

Extended hospital stay

1. MacDonald NE, Hall CB, Suffin SC, Alexson C, Harris PJ, Manning JA. Respiratory syncytial viral infection in infants with congenital heart disease. *N Engl J Med* 1982; 307: 397-400.
2. Navas L, Wang E, de Carvalho V, Robinson J, and Pediatric Investigators Collaborative Network in Infections in Canada. Improved outcome of respiratory syncytial virus infection in a high-risk hospitalized population of Canadian children. *J Pediatr* 1992;121: 348-54.
3. Khongphatthanayothin A, Wong PC, Samara Y, et al. Impact of respiratory syncytial virus infection on surgery for congenital heart disease: postoperative course and outcome. *Crit Care Med* 1999; 27: 1974-81.
4. Checchia PA, Appel HJ, Khan S, et al. Myocardial injury in children with respiratory syncytial virus infection. *Pediatr Crit Care Med* 2000; 1: 146-50.
5. Altman CA, Englund JA, Demmler G, et al. Respiratory syncytial virus in patients with congenital heart disease: a contemporary look at epidemiology and success of preoperative screening. *PediatrCardiol* 2000; 21: 433-8.
6. Willson DF, Landrigan CP, Horn SD, Smout RJ. Complications in infants hospitalized for bronchiolitis or respiratory syncytial virus pneumonia. *J Pediatr* 2003; 143: S142-9.





# Cardiología Pediátrica y VRS

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## Intervenciones

Periodos: Neonatal / Lactante

Tipos: Cirugía /Catéter

Cirugía bajo Circulación Extracorpórea

Paliative / Definitiva (Correctora)

Lesiones Residuales

Hemodinamicamente significativa

Mortalidad / Morbilidad Perioperatoria

Complicaciones Respiratorias:

Prolongación de Ventilación Mecánica



# Cardiología Pediátrica y VRS

## Status Funcional

Hemodinámicamente significativa: Alto riesgo

### **Significant:**

Any other CHD not classified as Non Significant

Clinical Heart Failure

Malnutrition (Weight <3 percentile for age-gender)

Hypoxemia ( Desaturation, need for supplementary O2)

Need for Cardiac Medication

Pulmonary Hypertension Moderate to Severe



# Cardiología Pediátrica y VRS

Costes Preoperatorios

PATIENTS AND HOSPITAL RESOURCES

CLINICAL	HOSPITAL RESOURCES
Add or increase oral medication	Need for augmented outpatient visits
IV Medication	Need for Hospitalization: Ward /ICU
Desaturation	Monitoring /Supplementary O2
Pulmonary Hypertension	Monitoring Repeated Echocardiography/ Catheterism
Heart Failure (Severe in cases)	Need for New Medication/ Device Therapy/ ECMO/ Heart Transplant
Induce Arrhythmias	Need for New medication / Electrophysiologic Study
Bronchospasm	Need for New Medication



# Cardiología Pediátrica y VRS

## Impacto Perioperatorio

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A great part of Infants with CHD are stable and awaiting Programmed Surgery in the first 6-12 months of life (ie. VSD, ToFallot, AV canal..)

RSV acute infection contraindicates anaesthetic or cardiac surgery in the following 4-6 weeks

Pediatric Cardiologists augmented follow up:

- Unstable, augmented medication, stop in weight curve

Anaesthetists : Re programming

- Repeated blood tests, blood derivatives not used

Cardiac Surgeons and Intensivists:

- Cardiopulmonary Bypass associated to Respiratory

Complications in Post-op period :

- Prolonged mechanical ventilation, O2 suppl.

- Other Infections

Cardio-Respiratory Interaction: Augmented Morbidity / Mortality



# Cardiología Pediátrica y VRS

## Postoperatorio

### Higher Risk:

Immediate postoperative period with any previous condition of hemodynamic significance (i.e: Medication)

Postoperative palliative surgery (i.e: Norwood, Glenn)

Postoperative significant residual lesions



# Cardiología Pediátrica y VRS

## COSTES EN GESTIÓN HOSPITALARIA

### ‘THE PICU OCCUPATION FACTOR’

Derivation to specialized centres with PICU /Pediatric Cardiology/ Cardiac Surgery with Specialized Transport in Severely ill patients

In Europe Mixed PICUs: Cardiac and Infectious Patients

Occupation of PICU Beds in Specialized Hospitals

Use of Isolated Box: Including Specific Staff

Competing with Cardiac Surgeries:

Surgeons and RSV have similar ‘Activity Curves’

Cancellation of Programmed Surgeries, Increased Waiting List

Strategies: RSV Test pre-Surgery ?





# Cardiología Pediátrica y VRS

## Infección Nosocomial

Pre-existing disease is associated with a significantly higher risk of death in severe respiratory syncytial virus infection. *K Thorburn. Arch Dis Child 2009 94: 99-103*

Paediatric Intensive Care,  
Liverpool  
20 bed  
Ped Cardiac and General

Pre-Exististing Disease  
and Nosocomial = High risk  
Mortality  
Prolonged PICU stay

**Table 4** Clinical characteristics in children admitted to the paediatric intensive care unit with severe respiratory syncytial virus infection

	Deaths, % (n = 35)	Survivors, % (n = 371)	RR (95% CI)
Pre-existing disease	100	41	2.36 (2.02 to 2.76)
2 or more pre-existing diseases	54	12	4.38 (2.92 to 6.58)
Cardiac anomaly	68	23	2.98 (2.16 to 4.12)
HPBF cardiac	65	64	1.01 (0.71 to 1.44)
Nosocomial infection	18	6	2.89 (1.26 to 6.6)
Ex-preterm	9	19	0.46 (0.15 to 1.39)
Under 6 weeks old	17	35	0.48 (0.23 to 1.02)
Under 1 year of age	71	78	0.91 (0.72 to 1.13)
Gender (male)	56	55	1.02 (0.75 to 1.4)
Bacterial co-infection	24	36	0.66 (0.35 to 1.24)
Inter-hospital transfer	32	52	0.61 (0.37 to 1.01)

Nosocomial infection: a risk factor for a complicated course in children with respiratory syncytial virus infection—results for a prospective multicenter German surveillance study. *A Simon Int J Hyg Environ Health 2008; 211:241-50*



# VRS en otras Patologías Cardíacas

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## Cardiomyopathies

Acquired (Myocarditis) / Familial (Genetic)

Heart Failure: Medication / Devices/ Heart Transplant

Respiratory Infection Severe Complications

## Arrhythmias

Severe need for hospitalization

Some triggered by Respiratory Infections

Medications: Beta-blockers vs Wheezing Medication

## Heart Transplant

Pre and post, Immunosuppression

## Pulmonary Hypertension With or without Heart Disease



# Estudios Epidemiológicos VRS Cardio

Conocer la realidad local

Factores de riesgo

Planificar/Optimizar profilaxis

# RSV and CHD: Palivizumab Clinical trial

FeltesTF, et al. J Pediatr. 2003;143:532-40.

## Cardiac Synagis Study Group

Palivizumab prophylaxis reduces hospitalization due to respiratory syncytial virus in young children with hemodynamically significant congenital heart disease.

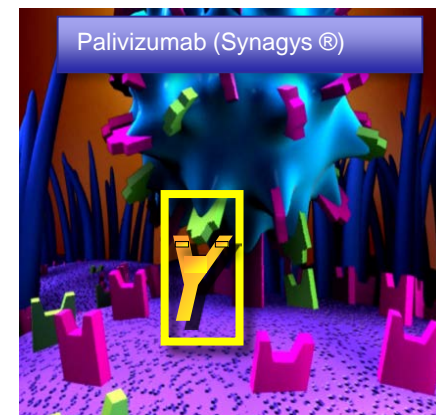
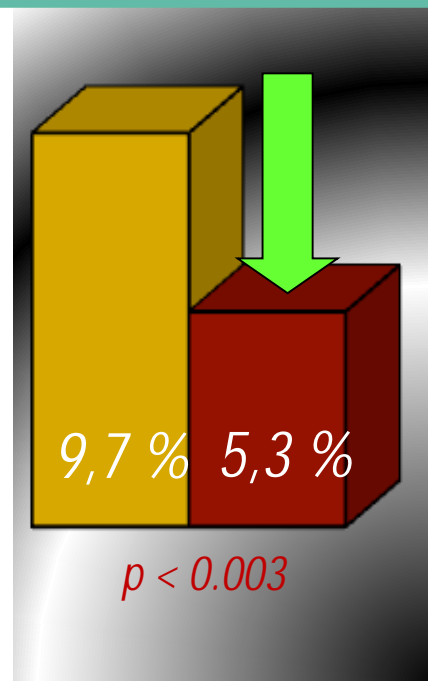
Pharmacokinetic:

Level Reduction post Cardiopulmonary Bypass

Safety:

No differences between Cyanotic vs Non Cyanotic patients

Limitations: Exclusion of seriously ill and syndromes.





# Estudios CIVIC



Spanish Society of  
Pediatric Cardiology and  
Congenital Heart Disease



*Medrano C et al. PIDJ 2010; 29: 1077-82*

*Community-acquired Respiratory Infections in  
Young Children With Congenital Heart Disease  
in The Palivizumab Era: The Spanish 4-Season  
CIVIC Epidemiologic Study ( 2004-2008)*

This trial has been sponsored by the Spanish Society of Pediatric Cardiology and  
Congenital Heart Disease (SECPCC)

# CIVIC: Participating Centers



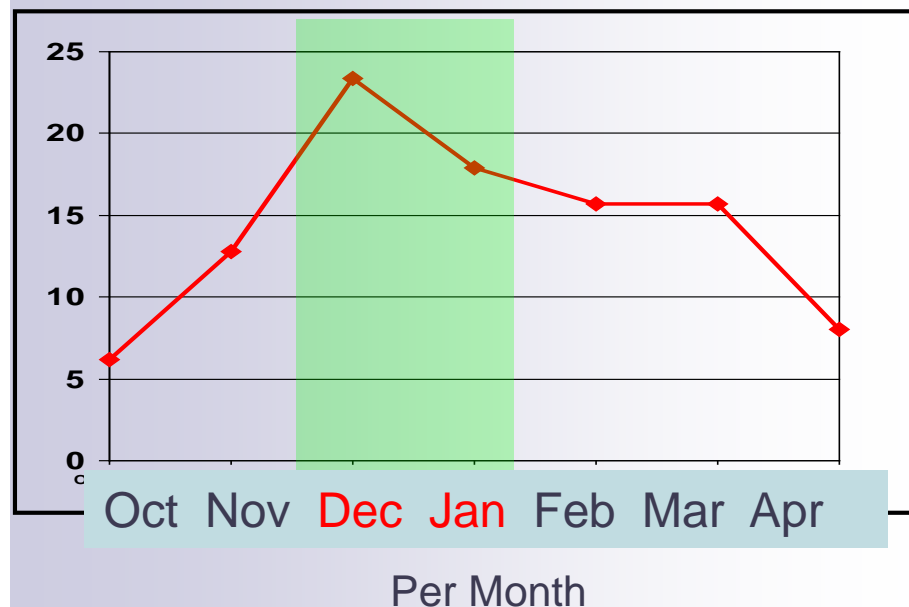
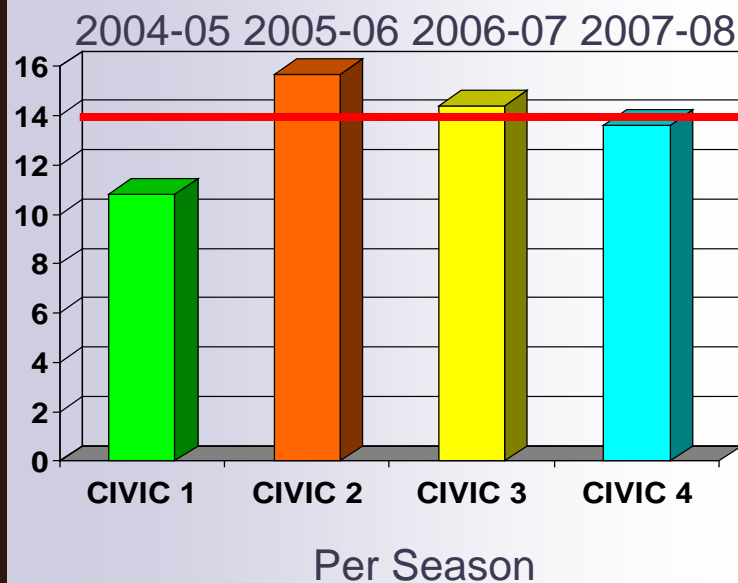




# RSV Vulnerability in CHD. CIVIC Data

Acute Respiratory Infection Hospitalizations in Children < 24 m/o with Hemodynamically Significant Heart Disease

Number	Rate
345/2613	13,5%





# RSV Vulnerability in CHD. CIVIC Data

Acute Respiratory Infection Hospitalizations in Children < 24 m/o with Hemodynamically Significant Heart Disease

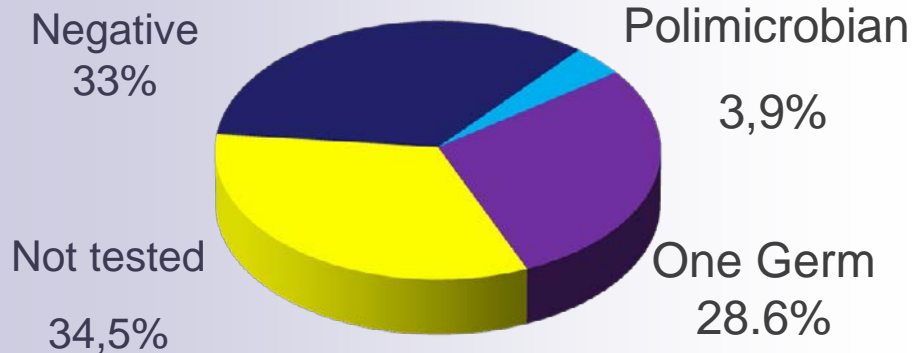
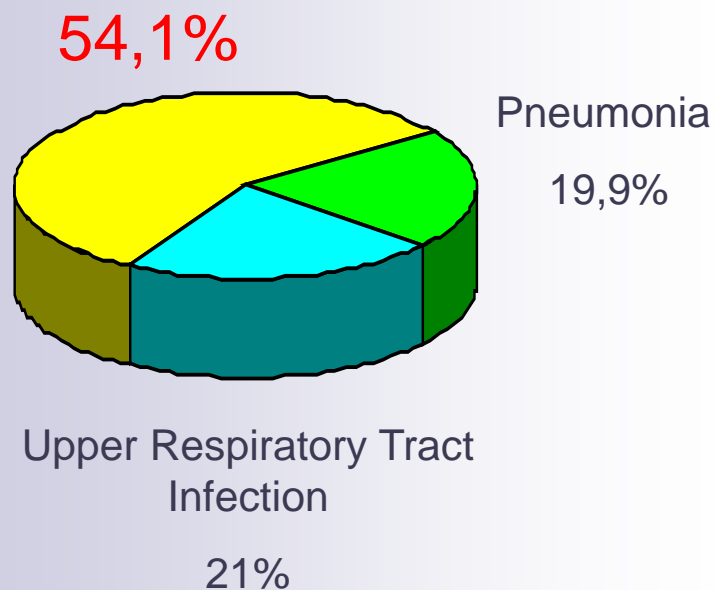
Hospital Stay	7 days	Median
Severe Disease	21,8%	Intensive Care Unit
Death	9 pts / 0,34%	Due to Respiratory Infection



# RSV Vulnerability in CHD. CIVIC Data

## Clinical and Microbiological Data

### Bronchiolitis



Germ NO  
77,5%  
(274)

Germ YES  
32,5%  
(115)

RSV: 27,1% (102 patients)



# RSV Vulnerability in CHD. CIVIC Data

## Acute Respiratory Infection Hospitalizations

### DUE TO RSV

in Children < 24 m/o with Hemodynamically Significant Heart Disease

Number	Rate
102/2613	3,8%

Hospital Stay	7 days	Median
Severe Disease	30,4%	Intensive Care Unit

# Heart Disease and RSV Risk Factors

Variable	Odds ratio	OR inf.95%	OR sup.95%
PRETERM	1,76	1,10	2,83
AGE > 12 month	0,18	0,07	0,52
Wheezing	3,16	1,61	6,19
Trisomy 21	2,02	1,21	3,37
22q11 del.	3,11	1,02	9,49
Immundef.	2,70	0,67	10,94
Other immunedepresion.	5,40	1,76	16,59
Palivizumab incomplete Prophylaxis	2,48	1,45	4,26



# Heart Disease and RSV Risk Factors

## Related to Patient Demographics

From CIVIC data

Patient Data	Lower Risk	Higher Risk
Weight	>3 percentile	< 3 percentile
Gender	Female	Male
Age	> 12 months	< 12 months
Gestational Age	Term	Preterm





# Heart Disease and RSV Risk Factors

## Related to Comorbidity

From CIVIC data

Comorbidity	Lower Risk	Higher Risk
Respiratory Pathology	No	Wheezing
Syndromes	No	22q11 Deletion, Down Syndrome
Immunodeficiency	No	Yes

*Kristensen K, et al. Chronic diseases, chromosomal abnormalities, and congenital malformations as risk factors for respiratory syncytial virus hospitalization: a population-based cohort study. Clin Infect Dis. 2012;54:810-7.*

*Yi H, et al. Respiratory syncytial virus prophylaxis in Down syndrome; a prospective cohort study. Pediatrics 2014; 133:1031-7.*

*Mori M et al. Risk and prevention of severe RS virus infection among children with immunodeficiency and Down's syndrome. J Infect Chemother. 2014; 20:455-9,*



# Heart Disease and RSV Risk Factors

## Other Factors

From CIVIC Data

	Lower Risk	Higher Risk
Siblings < 11 and/or	No	Yes

Increased numbers of persons sharing a bedroom  
>5 siblings

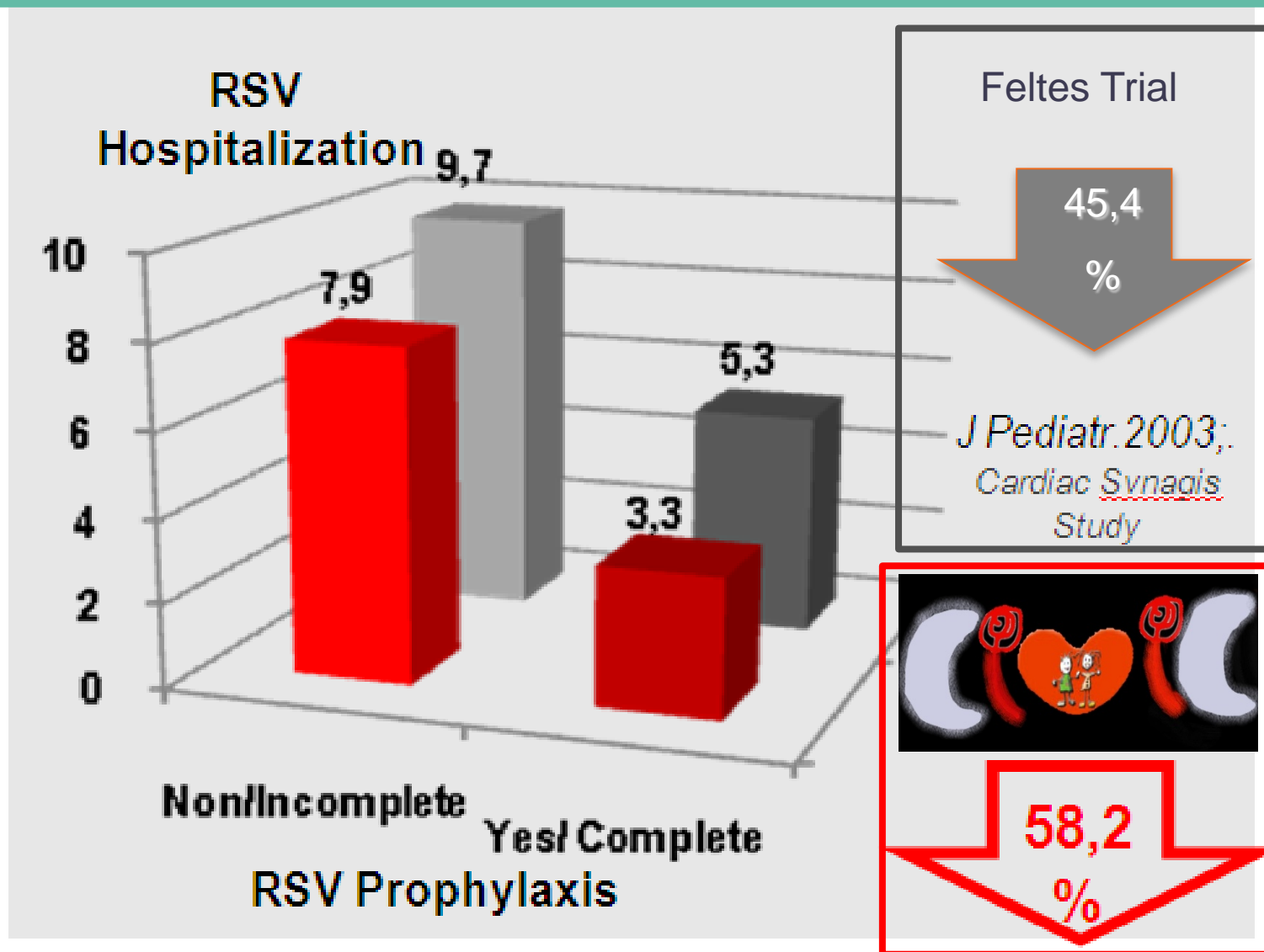
Increased in families with low maternal education and  
not breast-feed

*Simoes EA, et al. Enviromental and demographic risk  
factors for respiratory syncitial virus lower tract  
disease. J Pediatr 2003; 143;118-26*





# Heart Disease and RSV Prophylaxis





# Consensus on the clinical use of palivizumab in **Pediatric Cardiology**

Consenso clínico sobre la profilaxis de la infección  
e por virus respiratorio sincitial y el uso del palivizumab  
en cardiología pediátrica *An Pediatr (Barc).* 2010;72(6):432.e1-432.e13

C. Medrano López<sup>a,\*</sup>, L. García-Guereta<sup>b</sup>, L. Fernández Pineda<sup>c</sup>,  
P. Malo Concepción<sup>d</sup>, E. Maroto Álvaro<sup>a</sup>, J. Santos de Soto<sup>e</sup>,

CIVIC SECPCC Group



Sociedad Española de Cardiología  
Pediátrica y Cardiopatías Congénitas



# CLAVES

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OPTIMIZAR MEDIDAS PREVENTIVAS  
EN NIÑOS CON CARDIOPATÍAS DE ALTO RIESGO

ESTABLECER UN EQUIPO EN LOS HOSPITALES  
CONCIENCIADO EN EVITAR EL VRS

INTEGRACIÓN EN LOS CUIDADOS GENERALES Y EN LA  
ORGANIZACIÓN DE LOS MISMOS

SON LAS CLAVES, PERO NO SON SUFICIENTES..



## ES NECESARIO

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INTEGRAR DIFERENTES NIVELES ORGANIZATIVOS SANITARIOS  
PEDIATRAS GENERALES  
ESPECIALISTAS PEDIÁTRICOS  
CARDIÓLOGOS PEDIATRAS DE CENTROS SIN CIRUGÍA

PROMOVER LA INVESTIGACIÓN CLÍNICA  
ESTABLECER REDES COLABORATIVAS  
EXTENDER LA EXPERIENCIA DE ESPAÑA A OTROS PAÍSES

INVOLUCRAR A LAS AUTORIDADES SANITARIAS  
REALIZAR ESTUDIOS DE COSTES

CENTRARSE EN LAS FAMILIAS  
PROMOVER MEDIDAS DESDE LA COMUNIDAD

# GRACIAS

