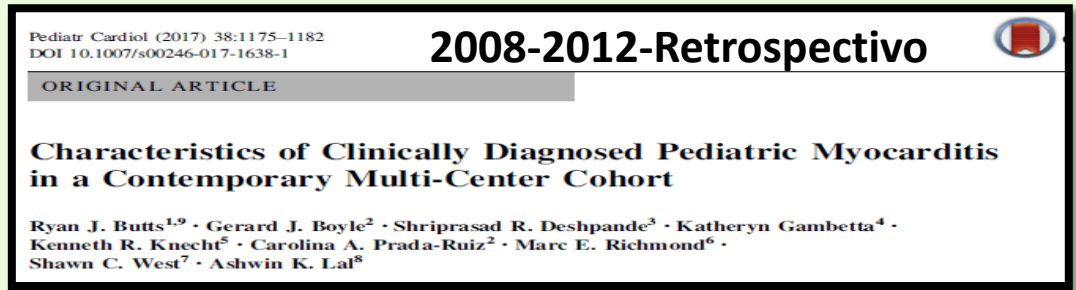


DESCRIPCIÓN DE LAS MIOCARDITIS EN LA ÚLTIMA DÉCADA: Revisión de nuestro Protocolo.



Moises Rodríguez
María Sánchez
HUMP. Abril 2018.

1. Introducción:



- Epidemiología desconocida en la actualidad.

- Causa importante de mortalidad.

- Limitaciones: Definición

Inmunohistoquímica

Histología



- **Objetivos:** describir las características demográficas, clínicas, métodos diagnósticos, tratamiento y factores pronósticos.

Justificación Protocolo





**171 pacientes; 2008-2012. Multicéntrico.
Retrospectivo.**

Pediatr Cardiol (2017) 38:1175–1182
DOI 10.1007/s00246-017-1638-1



ORIGINAL ARTICLE

Characteristics of Clinically Diagnosed Pediatric Myocarditis in a Contemporary Multi-Center Cohort

Ryan J. Butts^{1,9} · Gerard J. Boyle² · Shriprasad R. Deshpande³ · Katheryn Gambetta⁴ ·
Kenneth R. Knecht⁵ · Carolina A. Prada-Ruiz² · Marc E. Richmond⁶ ·
Shawn C. West⁷ · Ashwin K. Lal⁸

**149 pacientes; 2014-. Multicéntrico.
Prospectivo.**

Am Heart J. 2017 May;187:133-144. doi: 10.1016/j.ahj.2017.02.027. Epub 2017 Feb 24.

Toward evidence-based diagnosis of myocarditis in children and adolescents: Rationale, design, and first baseline data of MYKKE, a multicenter registry and study platform.

Messroghli DR¹, Pickardt T², Fischer M³, Opgen-Rhein B⁴, Papakostas K⁵, Böcker D⁶, Jakob A⁷, Khalil M⁸, Mueller GC⁹, Schmidt F¹⁰, Kaestner M¹¹, Udink Ten Cate FEA¹², Wagner R¹³, Ruf B¹⁴, Kiski D¹⁵, Wiegand G¹⁶, Degener F¹⁷, Bauer UMM², Friede T¹⁸, Schubert S¹⁷; MYKKE Consortium.

2. Métodos:

- Estudio **retrospectivo** en el Servicio de Pediatría del H.U. Puerta del Mar.
- Miocarditis aguda CIE-9; CIE-10. **Enero 2008- Marzo 2018.**
- **Criterios de inclusión:** < 14 años con diagnóstico según la **ESC** de miocarditis.

Criterios clínicos	Pruebas Complementarias
Dolor torácico agudo, pericárdico o pseudoisquémico.	Alteración funcional o estructural en ecocardiografía o RMN
Disnea aguda/crónica o empeoramiento de disnea basal +/- fallo cardíaco derecho.	Alteración tisular en RMN
Palpitaciones, arritmias inexplicadas, síncope o muerte súbita.	Alteraciones ECG
Insuficiencia cardíaca congestiva o shock cardiogénico no explicado por otras causas.	Elevación de troponina T/ proBNP



European Society of Cardiology, 2013

1 criterio clínico+ 1 P.Complementaria alterada o Dos pruebas complementarias compatibles

2. Métodos:



- **Criterios de exclusión:** cardiopatía previa, alteración coronaria, enf. de Kawasaki, causa extracardíaca que justifique el cuadro.
- Se recogieron **datos demográficos, clínicos, de laboratorio, ecocardiográficos, terapéuticos y pronósticos.**
- Se analizaron con el software estadístico *Stata 14*.

3. Resultados:

Demográficos

39 pacientes

10 excluidos

29 Miocarditis

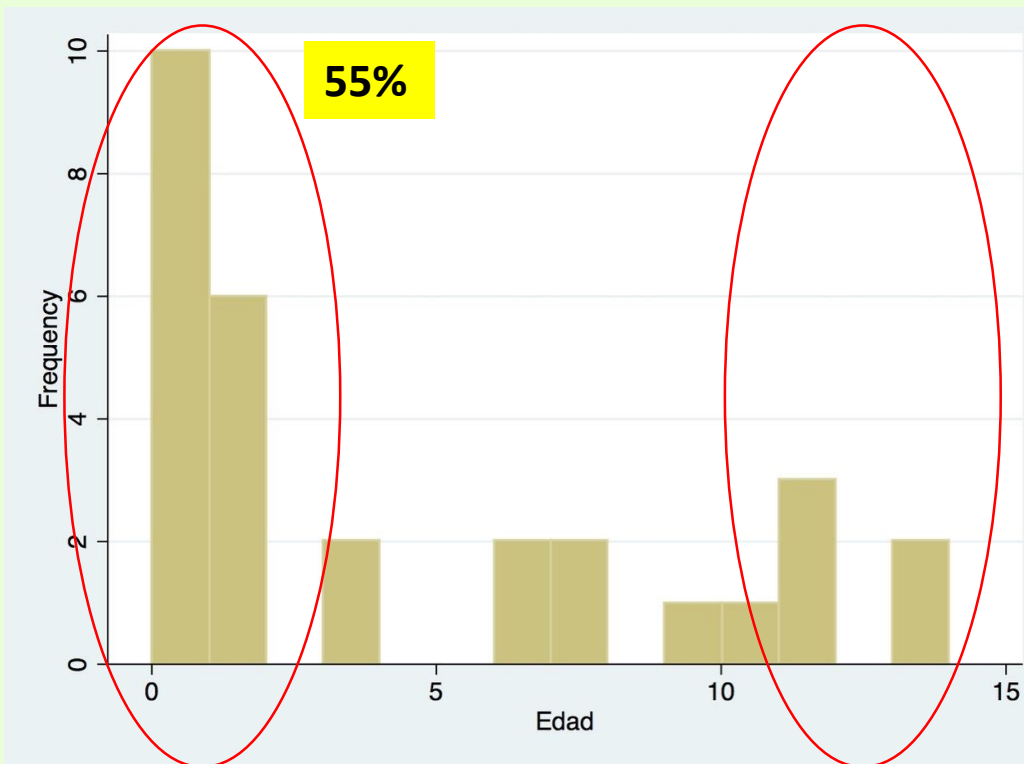
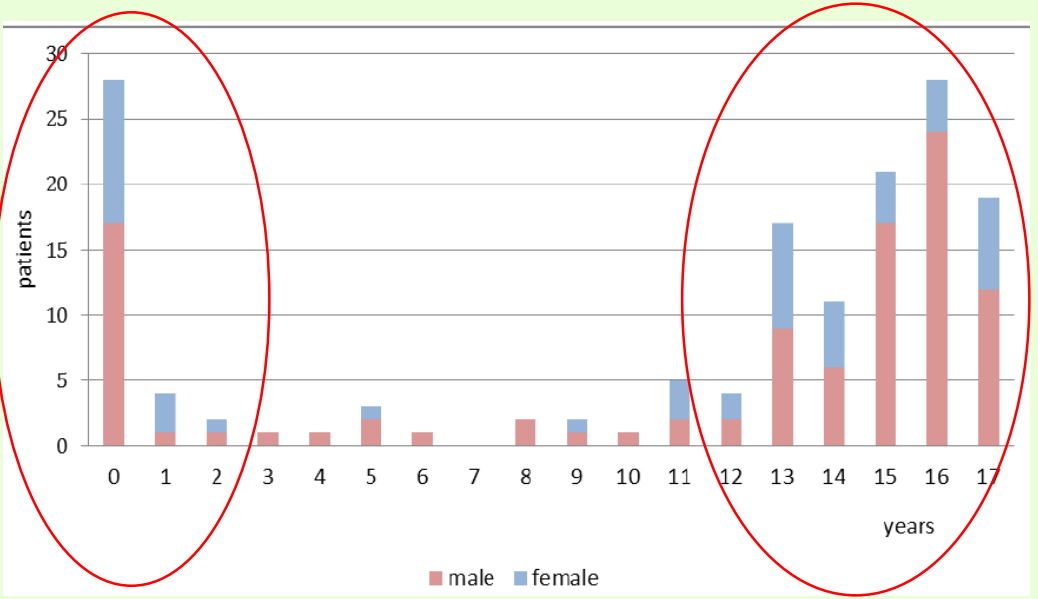


19



10

- 4 bronquiolitis
- 3 No documentación
- 1 Cardiopatía previa
- 2 Sindrómico



Am Heart J. 2017 May;187:133-144. doi: 10.1016/j.ahj.2017.02.027. Epub 2017 Feb 24.

Toward evidence-based diagnosis of myocarditis in children and adolescents: Rationale, design, and first baseline data of MYKKE, a multicenter registry and study platform.


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3. Resultados:

Noninfectious aetiologies

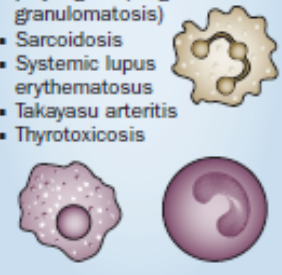
Toxins

- Anthracyclines
- Cocaine
- Interleukin-2



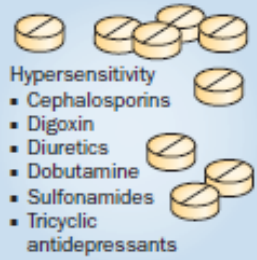
Immunological syndromes

- Churg–Strauss syndrome
- Diabetes mellitus
- Inflammatory bowel disease
- Giant cell myocarditis
- Granulomatosis with polyangiitis (Wegener granulomatosis)
- Sarcoidosis
- Systemic lupus erythematosus
- Takayasu arteritis
- Thyrotoxicosis



Hypersensitivity

- Cephalosporins
- Digoxin
- Diuretics
- Dobutamine
- Sulfonamides
- Tricyclic antidepressants

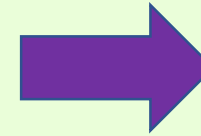


Adaptado de: Pollack, A et al. Nat. Rev. Cardiol. 2015 Nov; 12 (11): 670-80.

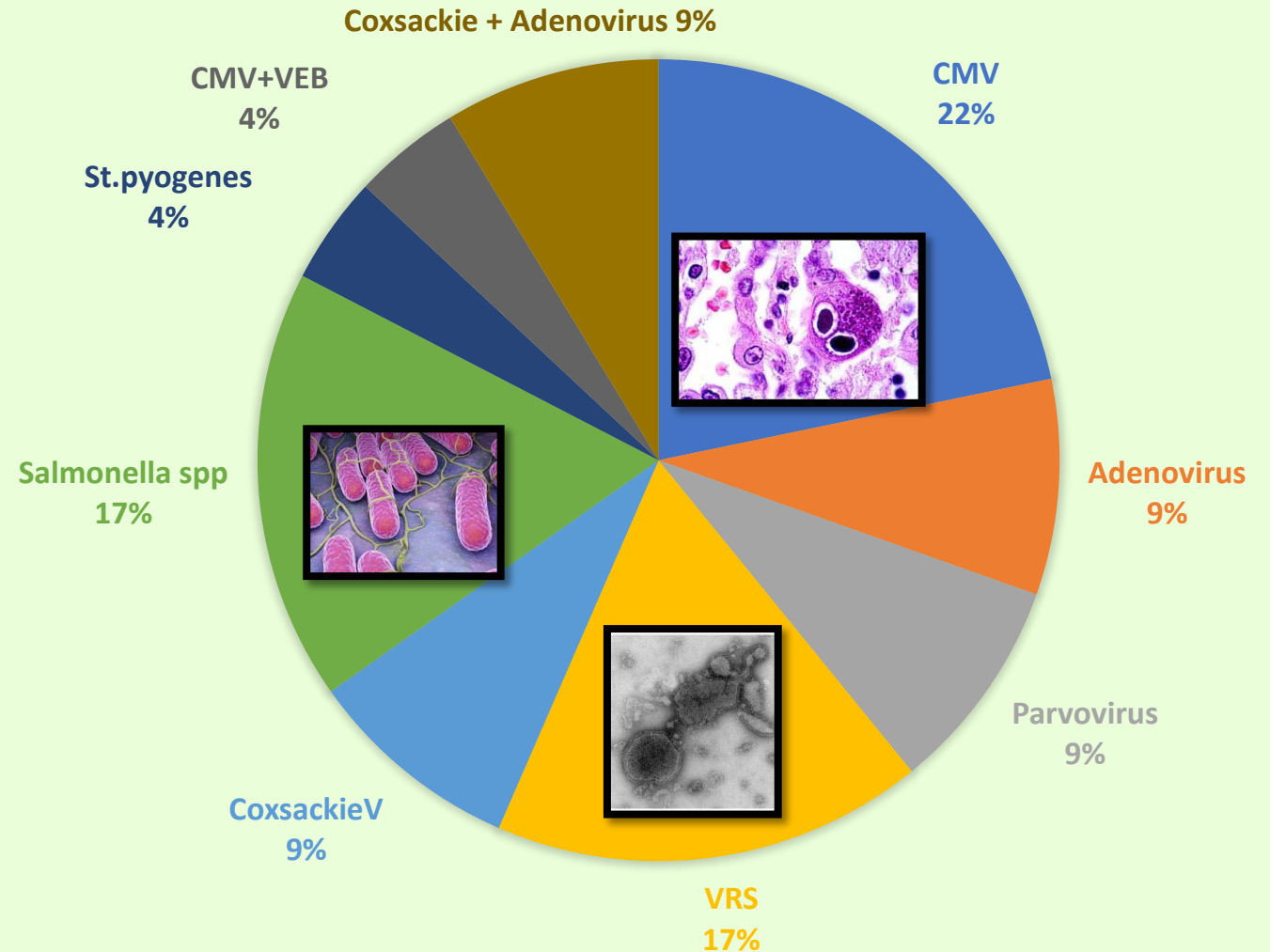
Table 2 Identified viral pathogens

Specific viral pathogens	No. of patients (n = 62)
No pathogens identified	42 (68%)
Parainfluenza	8 (13%)
Coxsackie	4 (6%)
Adenovirus	2 (3%)
Influenza A	2 (3%)
Parvovirus	1 (2%)
Coinfections	3 (5%)
Echovirus, coxsackie B	1 (2%)
Influenza A and B, adenovirus	1 (2%)
Coxsackie A, adenovirus	1 (2%)
Patients with known pathogen (%)	32%

Etiopatogenia:



6: No infecciosas



Am J Emerg Med. 2009 Oct;27(8):942-7. doi: 10.1016/j.ajem.2008.07.032.

Pediatric myocarditis: presenting clinical characteristics.

Durani Y¹, Egan M, Baffa J, Selbst SM, Nager AL.



Individualizar

Se seleccionará el perfil de miopericarditis pediátrica de Diraya:

Serología a cosackie, adenovirus, parvovirus B19, citomegalovirus, virus Epstein Barr, Virus herpes humano 6 y mycoplasma pneumoniae.

*Serología para hepatitis A, B y C; herpes simplex virus 1 y 2.

*La realización de técnicas PCR será de elección en líquido pericárdico.

*Detección antigénica de legionella en orina si caso de sospecha clínica.

*Coprocultivo a virus (incluyendo norovirus) y bacterias si antecedente de cuadro digestivo.

*PCR para virus respiratorios y Mycoplasma pneumoniae (incluir VRS y gripe) en aspirado nasofaríngeo o aspirado traqueal en caso de sospecha.

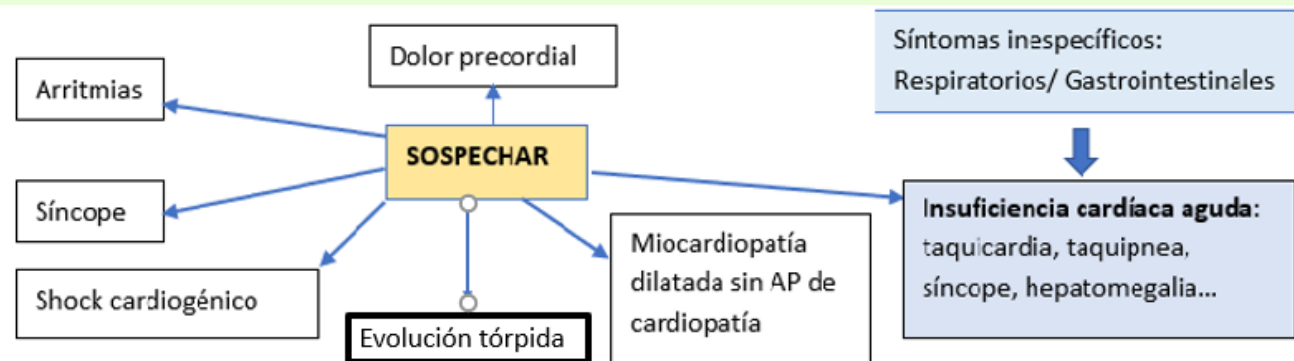
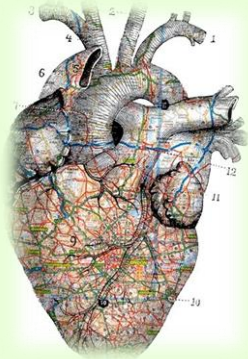
3. Resultados:

Clínica:

Circ J. 2011;75(3):734-43. Epub 2011 Feb 4.

Guidelines for diagnosis and treatment of myocarditis (JCS 2009): digest version.

JCS Joint Working Group.



Clínica cardiológica: 31%(n=9)

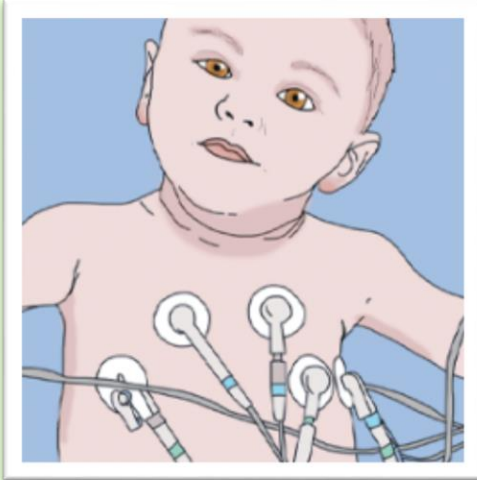
T. evolución: 2 días(IQR 4-10)

	Moderate-severe depressed ventricular function (n = 74)	Mildly depressed to normal function (n = 90)	p Value
Female (n, %)	44 (59.5%)	26 (68.1%)	<0.01
Age (years)	3.7 (0.7-12.8)	15.3 (12.5-16.6)	<0.01
Symptoms at presentation			
Chest pain	10 (13.5%)	64 (71.1%)	<0.01
Dyspnea	16 (21.6%)	20 (22.2%)	0.76
Respiratory distress	11 (12.2%)	33 (44.6%)	<0.01
GI symptoms	31 (41.9%)	15 (16.7%)	<0.01
Malaise/fatigue	27 (36.5%)	14 (15.6%)	<0.01
Viral prodrome	42 (46.7%)	26 (35.1%)	0.14

2 - Initial symptoms	
Exercise intolerance	70.9% (105/148)
Angina pectoris	41.9% (62/148)
Dyspnea	37.2% (55/148)
Arrhythmia	30.4% (45/148)
Feeding intolerance	18.2% (27/148)
Syncope	12.2% (18/148)
Sudden cardiac death	2.7% (4/148)
Other	14.8% (22/149) including nausea/vomiting (5), loss of appetite (2), fever (2), abdominal pain, zyanosis, coughing, paraesthesia of left hand, increased sensitivity to touch, sinus tachycardia, hypertension, epistaxis, perspiration, upper respiratory tract infection, sore throat, erythema migrans, tick bite

3. Resultados:

Exploración clínica :



- Taquicardia (12)
- Distrés respiratorio (11)(37%)
- Hipotensión (8)
- Hepatomegalia (4)(13.7%)
- Edema (3)
- Crepitantes (2)

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Malaise/fatigue	27 (36.5%)	14 (15.6%)	<0.01
Viral prodrome	42 (46.7%)	26 (35.1%)	0.14
Physical exam findings			
Hepatomegaly	27 (36.5%)	8 (8.9%)	<0.01
Gallop	27 (36.5%)	6 (6.7%)	<0.01
Respiratory distress	25 (33.8%)	10 (11.1%)	<0.01
Diminished extremity pulses	21 (28.4%)	6 (6.7%)	<0.01
No significant findings	15 (20.3%)	66 (73.3%)	<0.01

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Ryan J. Butts^{1,9} · Gerard J. Boyle² · Shriprasad R. Deshpande³ · Katheryn Gambetta⁴ · Kenneth R. Knecht⁵ · Carolina A. Prada-Ruiz² · Marc E. Richmond⁶ · Shawn C. West⁷ · Ashwin K. Lal⁸

3. Resultados:

Diagnóstico laboratorio:

	Moderate-severe depressed ventricular function (n = 74)	Mildly depressed to normal function (n = 90)	p Value
Labs, imaging, and pathology			
TnI (ng/mL)	1.2 (0.17-12.1)	8.5 (0.97-21.6)	<0.01
ESR (mm/hr)	7 (2-33)	12 (7-33)	0.05
CRP (mg/dL)	4.5 (1-13)	4.6 (1.2-16.3)	0.24
BNP (pg/mL)	2241 (773-4000)	144 (68.5-1703)	<0.01

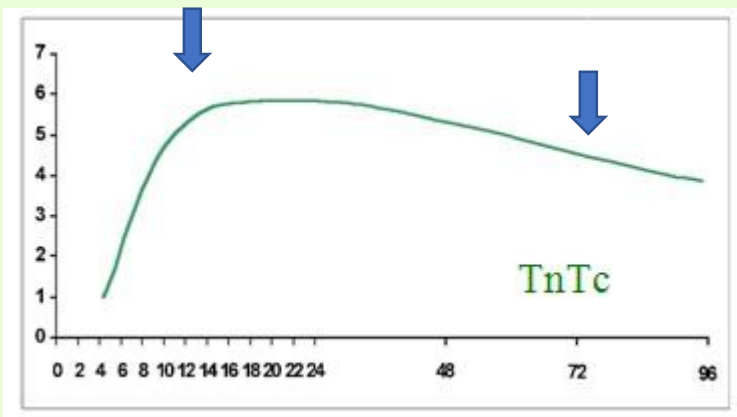


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ORIGINAL ARTICLE

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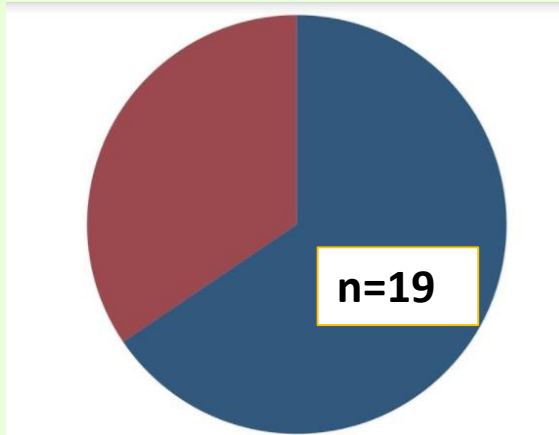
Ryan J. Butts^{1,9} · Gerard J. Boyle² · Shriprasad R. Deshpande³ · Katheryn Gambetta⁴ · Kenneth R. Knecht⁵ · Carolina A. Prada-Ruiz² · Marc E. Richmond⁶ · Shawn C. West⁷ · Ashwin K. Lal⁸



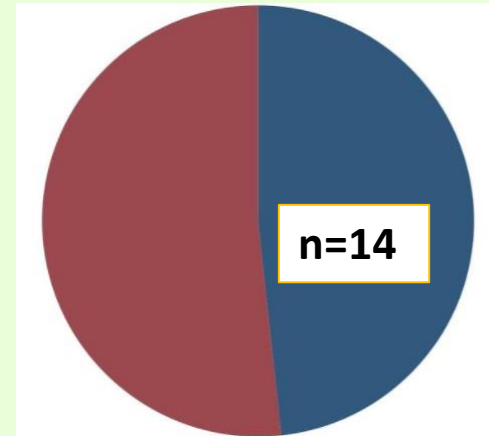
- **PCR(mg/dl): 19(IQR 4.5-7)**
- **Troponina(pg/ml), n=27: 61(IQR 27-714).**
- **NT-ProBNP(pg/ml), n=21:1660(248-7263).**
- **Sodio(mEq/L):137(IQR 135-139).**

3. Resultados:

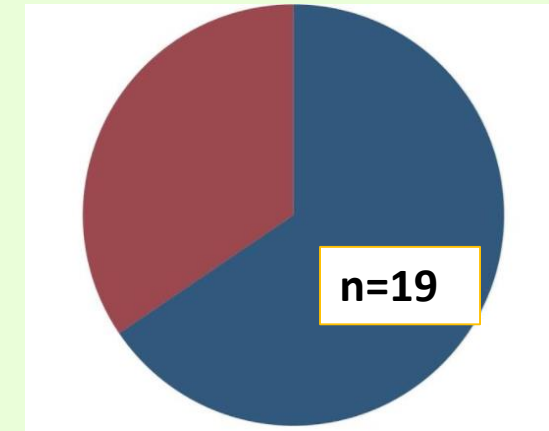
Diagnóstico ECG:



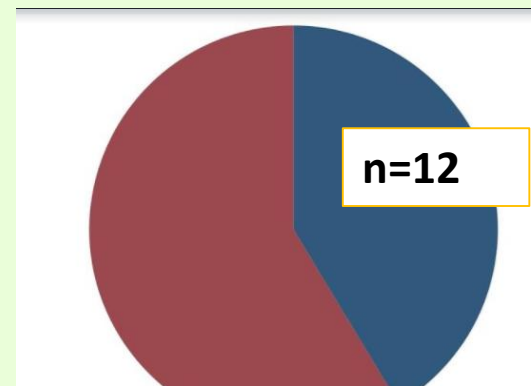
Diagnóstico Ecocardiográfico:



Derrame pericárdico



Dilatación Ventrículo IZQ



Disfunción sistólica VI

Severity of Ventricular Dysfunction

Of the 171 patients, 164 patients had a recorded EF or SF at admission. In total there were 67 patients with normal ventricular function, 23 with mild ventricular dysfunction, 29 with moderate ventricular function, and 45 with severe ventricular function. Further analysis was performed by

56%

Am J Emerg Med. 2009 Oct;27(8):942-7. doi: 10.1016/j.ajem.2008.07.032.

Pediatric myocarditis: presenting clinical characteristics.

Durani Y¹, Egan M, Baffa J, Selbst SM, Nager AL.

Abnormal EKG	59/59 (100%)
Sinus tachycardia	27 (46%)
Ventricular hypertrophy	24 (41%)
ST wave abnormality	19 (32%)
T wave abnormality	18 (31%)
Bundle-branch block	6 (10%)
Arrhythmia	4 (7%)
AV block	3 (5%)
Prolonged QT interval	3 (5%)

3. Resultados:

RMN cardíaca con gadolinio

Diagnóstico:

Dos primeras semanas y estable.



RMN: n= 9

97% E

RMN : n=6 cumple criterios

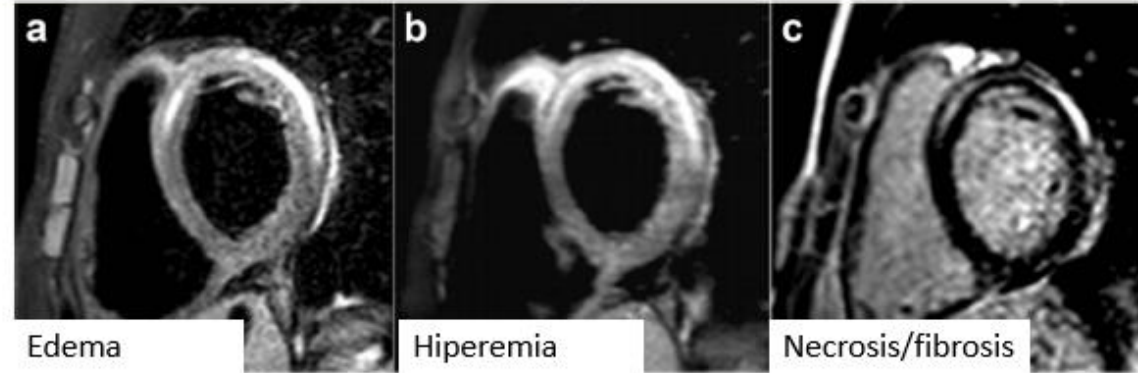


Fig. 1 Typical findings of myocarditis on CMR. 16-year-old patient with a midwall and subepicardial distribution of increased signal intensity in the left ventricle on T2-weighted (a), T1-weighted early gadolinium enhancement (b), and late gadolinium enhancement (c) imaging

Table 1 Comparison based upon degree of ventricular dysfunction

	Moderate-severe depressed ventricular function (n = 74)	Mildly depressed to normal function (n = 90)	p Value
Positive MRI ^b (n, %)	9 (56.3%)	22 (64.7%)	0.78
Positive PCR (n, %)	26 (35.1%)	14 (15.6%)	<0.01

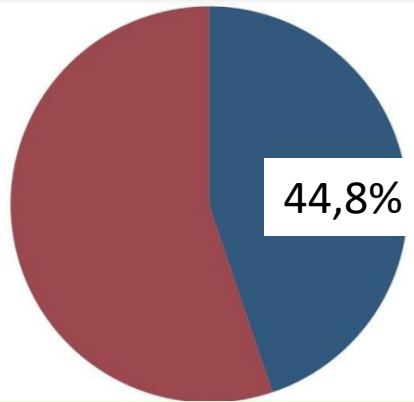
3. Resultados:

Tratamiento:



Farmacológico (BB, IECAS...): n=20 (68.9%)

Pharmacologic therapy	heart failure: 55.0%, catecholamines: 28.9%, anti-arrhythmic: 26.2%, non-steroidal anti-inflammatory: 26.8%, corticosteroids: 5.4%, interferon- β : 0.0%, immunoglobulins: 28.9%, virostatic: 2.7% (n=147-149)
Ventilation	20.9% (31/148)



44,8%

Ventilación mecánica: n=11 (37,9%)

Inotrópicos: n=10(34,4%)

ECMO: n=1 (3,4%)

No transplante

Outcomes were assessed for the initial hospitalization. There were 149 cases of transplant-free survival to discharge (87%) and 22 cases (13%) of death/transplant. Of these 22 patients with poor outcomes in the initial hospitalization, 16 required transplantation (9%) and seven died (4%; 1 after transplant). Those with poor outcomes (death

Exitus: n=4 (13,7%)

7 - Adverse events	
Death	2.8% (4/144)
Heart transplantation	2.1% (3/140)

Ingreso en UCIP

3. Resultados:

Complicaciones precoces:

Exitus: n=4

Miocardopatía dilatada al alta: n=7

Miocardopatía a los 12
meses: n=1



Justificación Protocolo

**¿ Podemos establecer factores
pronósticos?**

3. Resultados:

Pronóstico:

Variable	Mal px (n=11)	Buen px (n=18)	p valor
Edad	2 (0,08-2)	7 (0,66-11)	p=0,04
Sexo (mujer)	4 (36%)	6 (33%)	p=0,86
Tiempo evolución	6 (6-13)	3 (2-5)	p= 0,04
Clínica Cardiológica	2 (19%)	7 (39%)	p =0,24
Hipotensión	3 (27%)	5 (27%)	P=0,97
NT-proBNP(pg/ml)	3575 (1145-7955)	490 (188-5485)	p=0,15
Troponina(pg/ml)	35 (5-152)	278 (29-833)	p=0,08
PCR(mg/dl)	19 (2-70)	35 (4-168)	p= 0,87
Sodio (mEq/ml)	138 (135-139)	137 (135-139)	p=0,13
ECG alterado	8 (72%)	11 (61%)	p=0,24
Derrame pericárdico	4 (36 %)	10 (55%)	p=0,31
Dilatación VI	10 (90%)	9 (50%)	p=0,025
FE disminuida	7 (64%)	5 (27%)	p=0,04
Aislamiento micro	8 (72%)	16 (88%)	p= 0,26
RMN positiva	2 (18%)	7 (39%)	p=0,24
UCIP	6 (54%)	7 (38%)	p=0,41
Inotrópicos	4 (36%)	6 (33%)	p=0,86
VM	5 (45%)	6 (33%)	p=0,51
ECO ALTERADA	11 (100%)	8 (55%)	p=0,01
Shock cardiogénico	3(27%)	3(27%)	P=0.94



Menor edad



Más tiempo consultar



Ecocardiografía más alterada

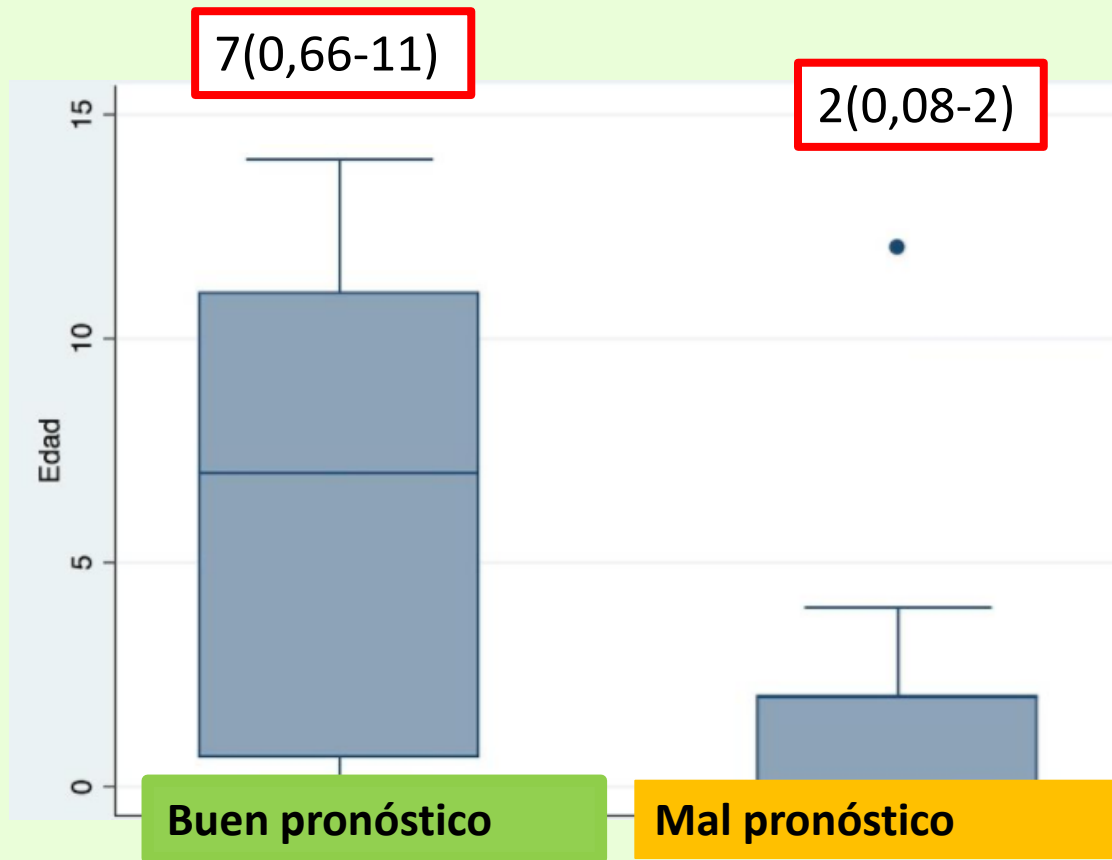


Peor pronóstico

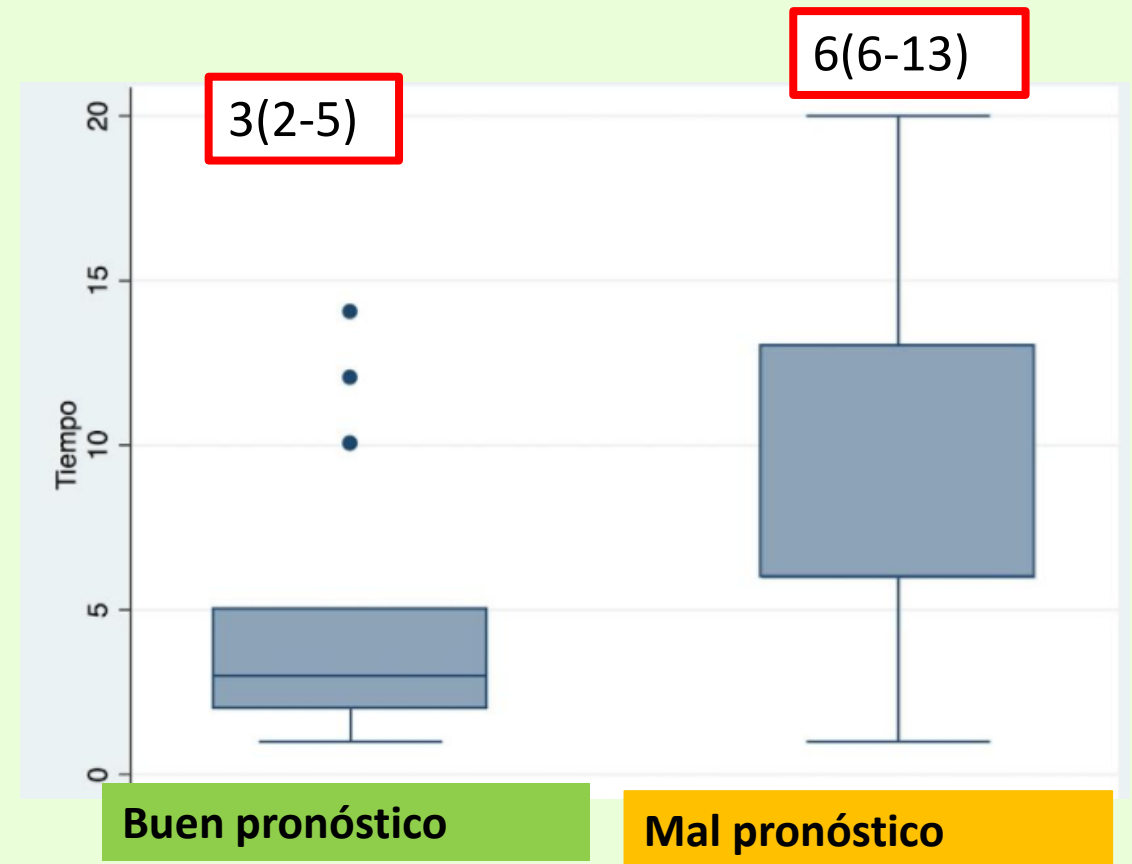


3. Resultados:

Pronóstico:



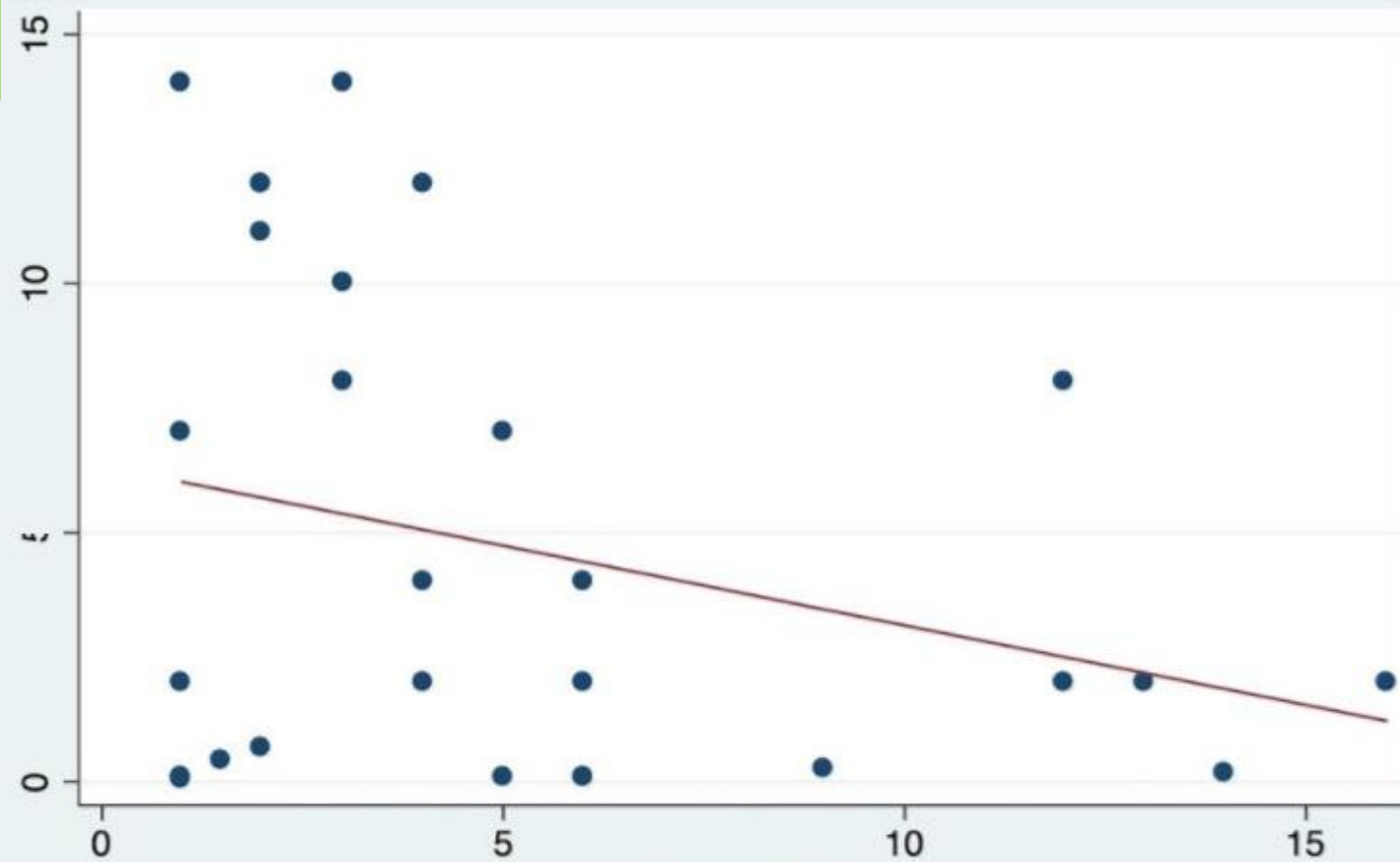
Edad; $p=0,04$



Tiempo de evolución; $p=0,04$

3. Resultados:

Edad

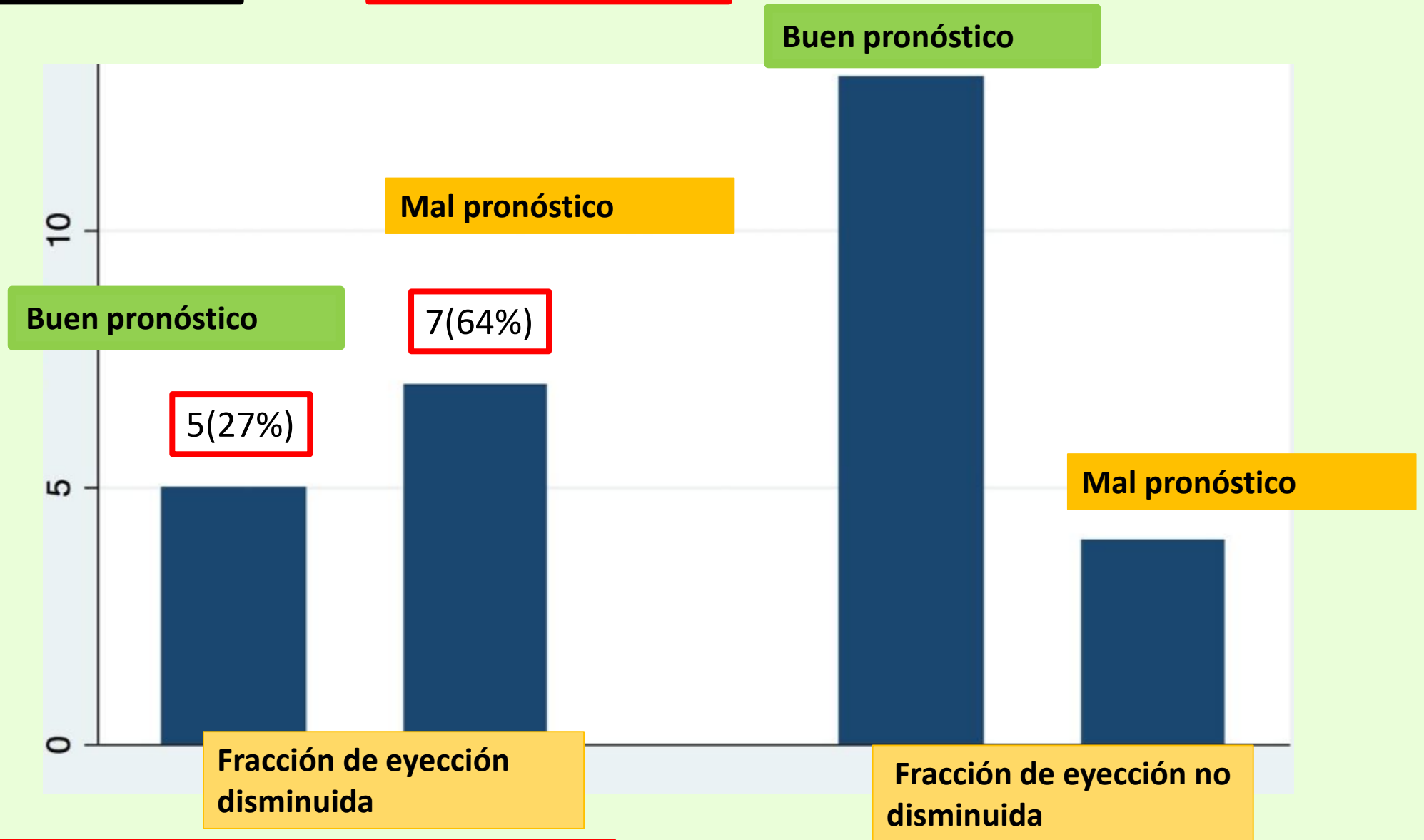


Tiempo de evolución

$r = -0.28$
 $p = 0,133$

3. Resultados:

Pronóstico:

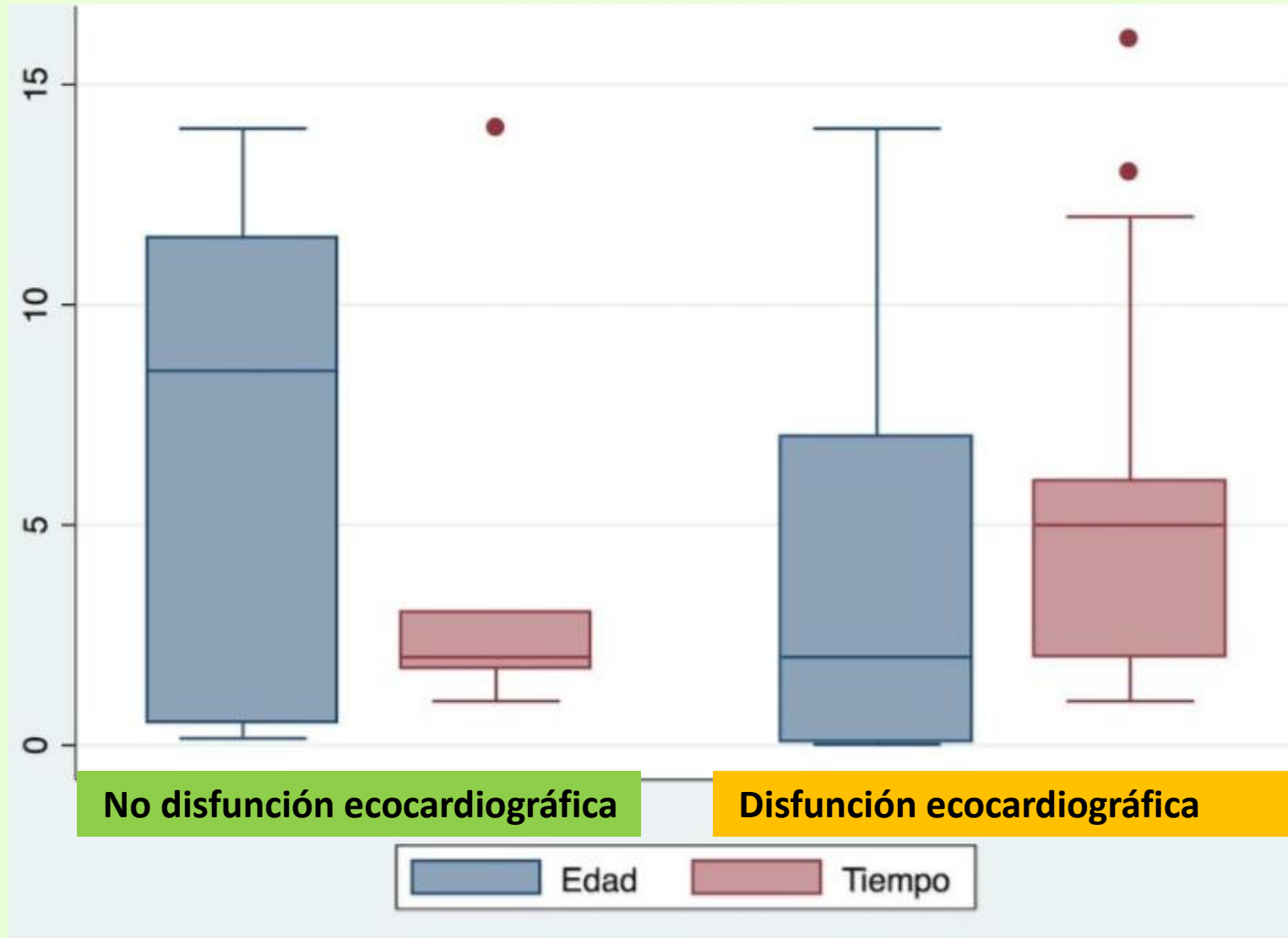


Disfunción ecocardiográfica; $p=0,04$

3. Resultados:

Pronóstico:

$p=0,18$



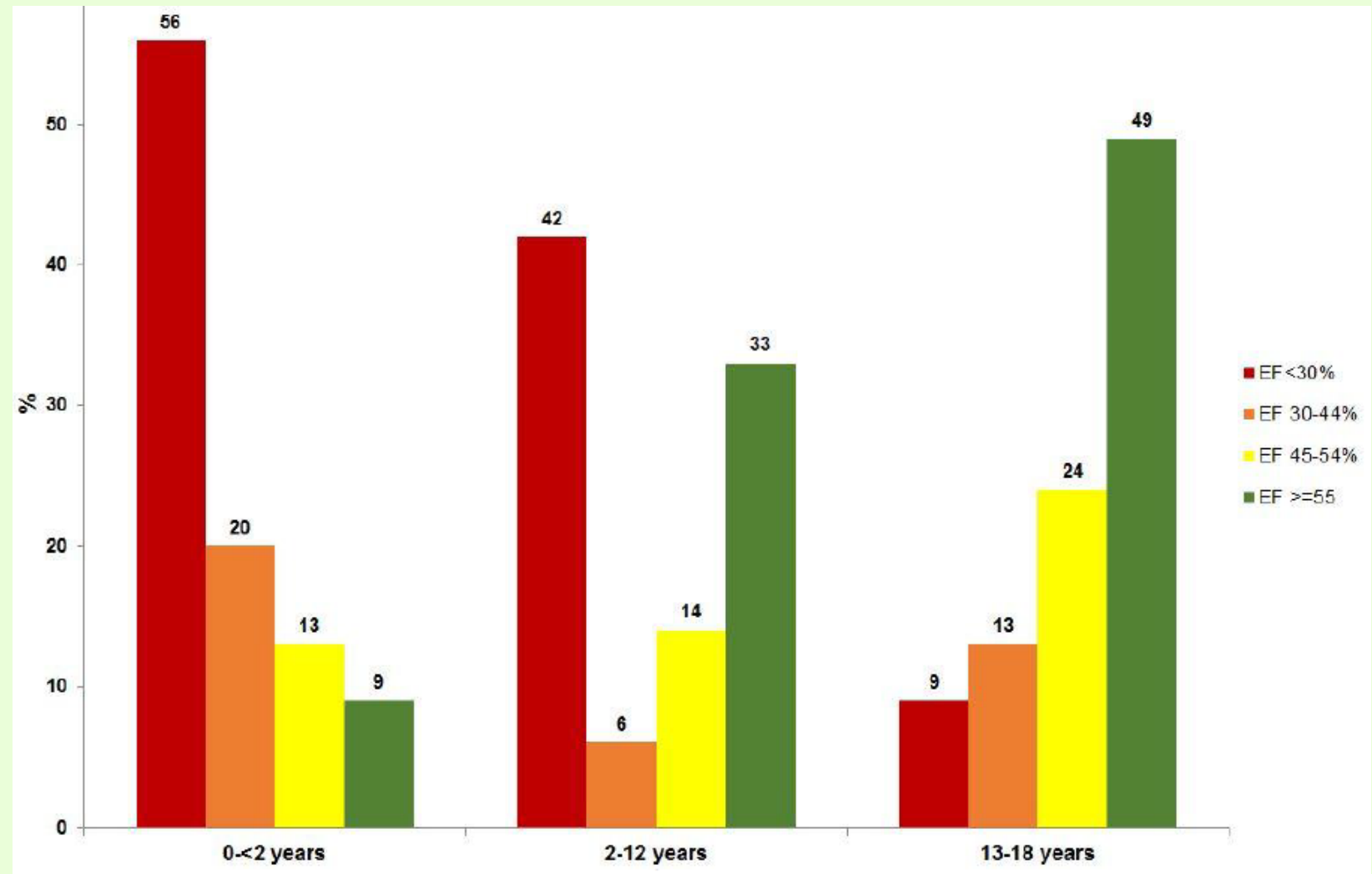
3. Resultados:

Menor edad



Ecocardiografía más alterada

Comparación:



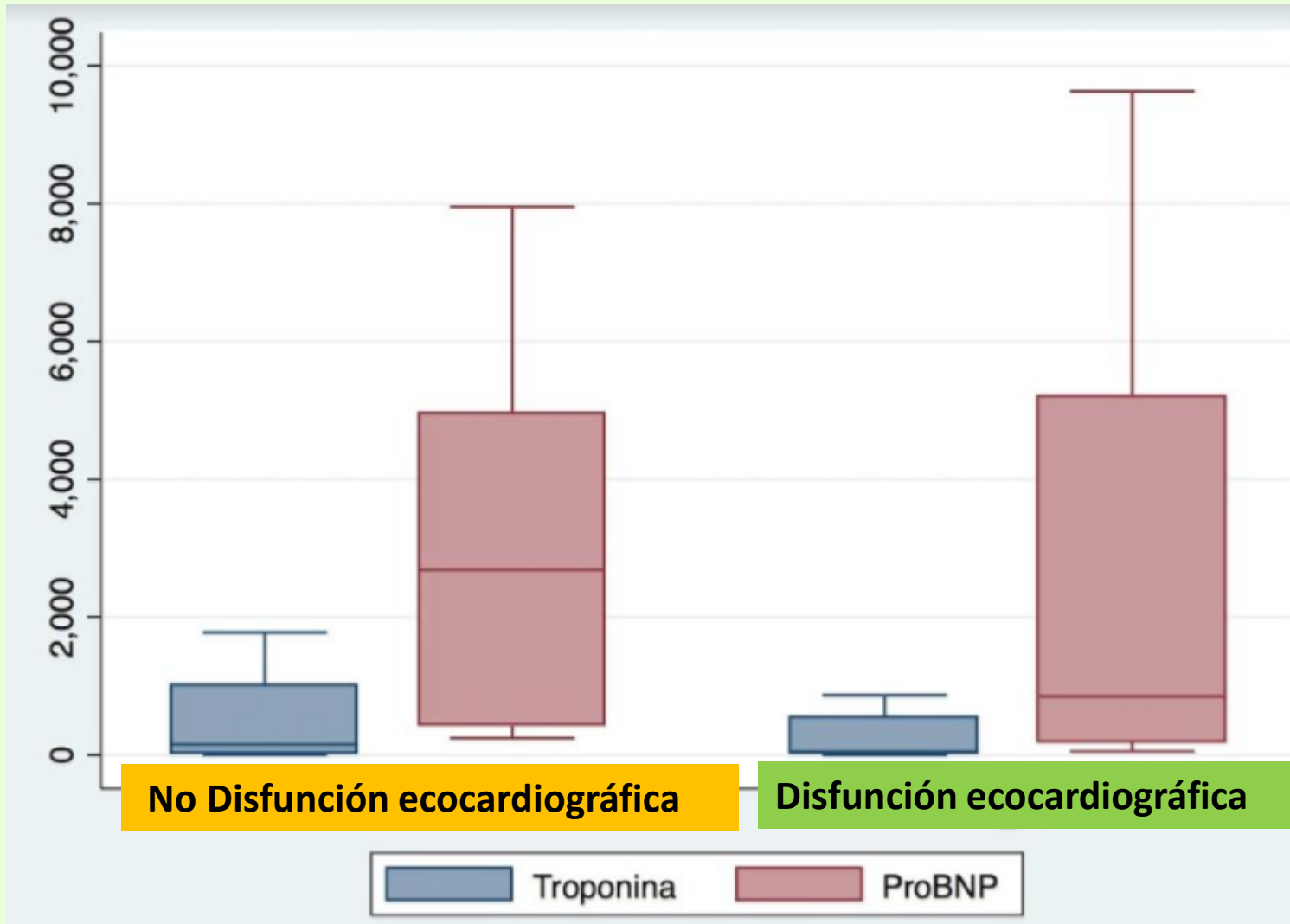
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3. Resultados:

Pronóstico biomarcadores:

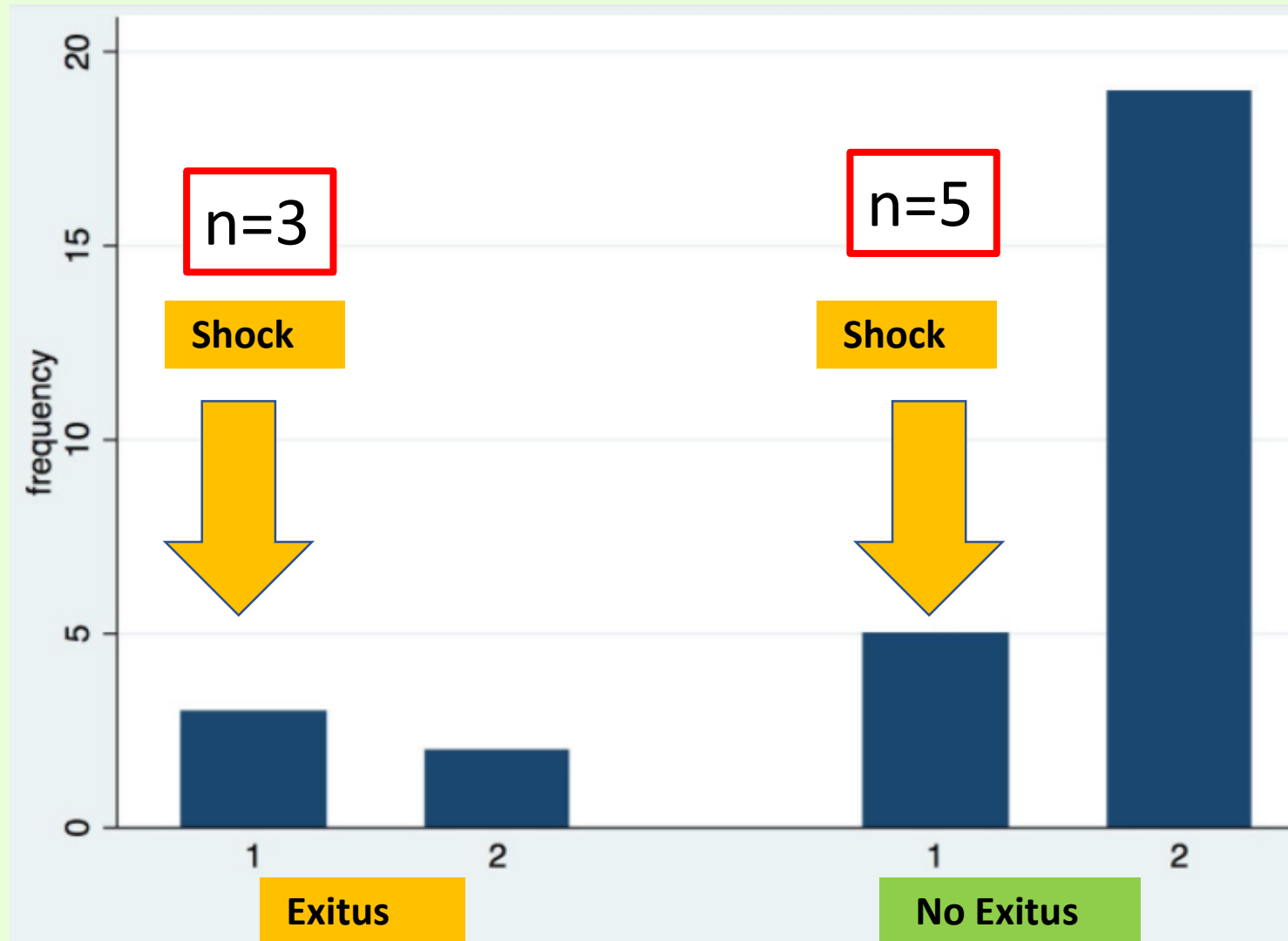


$p=0,47$

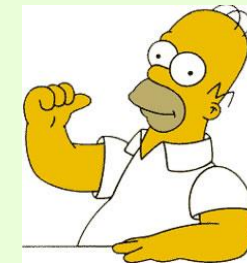
proBNP más elevado
peor pronóstico.

3. Resultados:

¿ Shock y mortalidad?



p=0,94



MENSAJES PARA LLEVAR A CASA:

- Infrecuente y mortalidad elevada.



Prevalente en < 2 años

Peor pronóstico

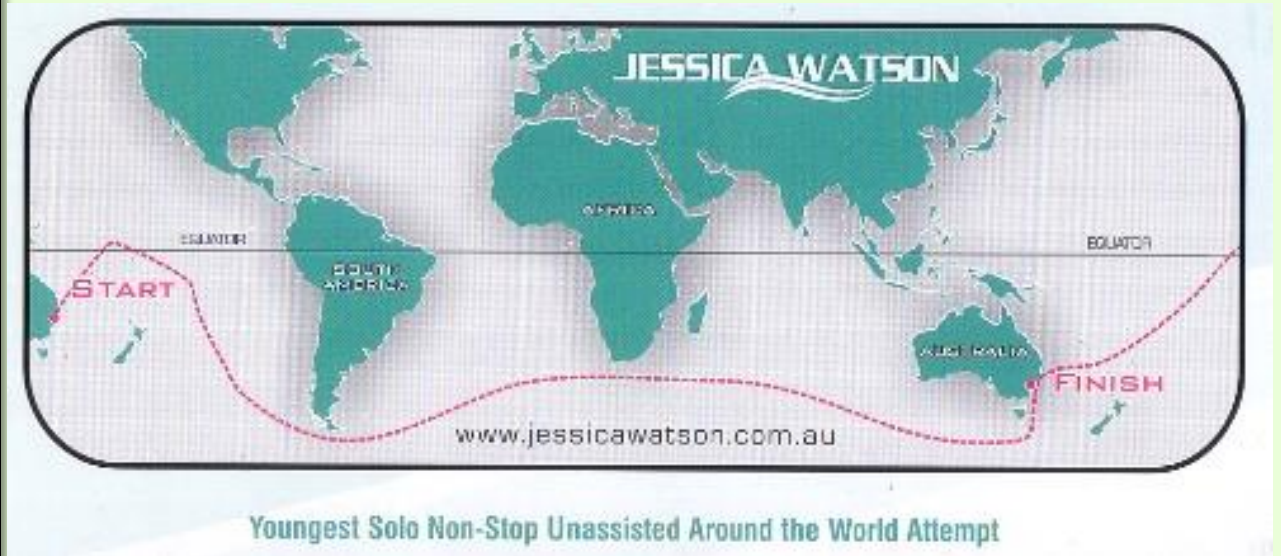
Más tiempo de evolución

Ecocardiografía
Más alterada



- ProBNP y troponinas no factores pronósticos

Pensar en cuadros respiratorios, gastrointestinales que reacuden



**NO PUEDES CAMBIAR LAS CONDICIONES,
SIMPLEMENTE TIENES QUE LIDIAR CON ELLAS.
(J.Watson)**

gracias