
# Criterios de Calidad en el manejo del lactante febril

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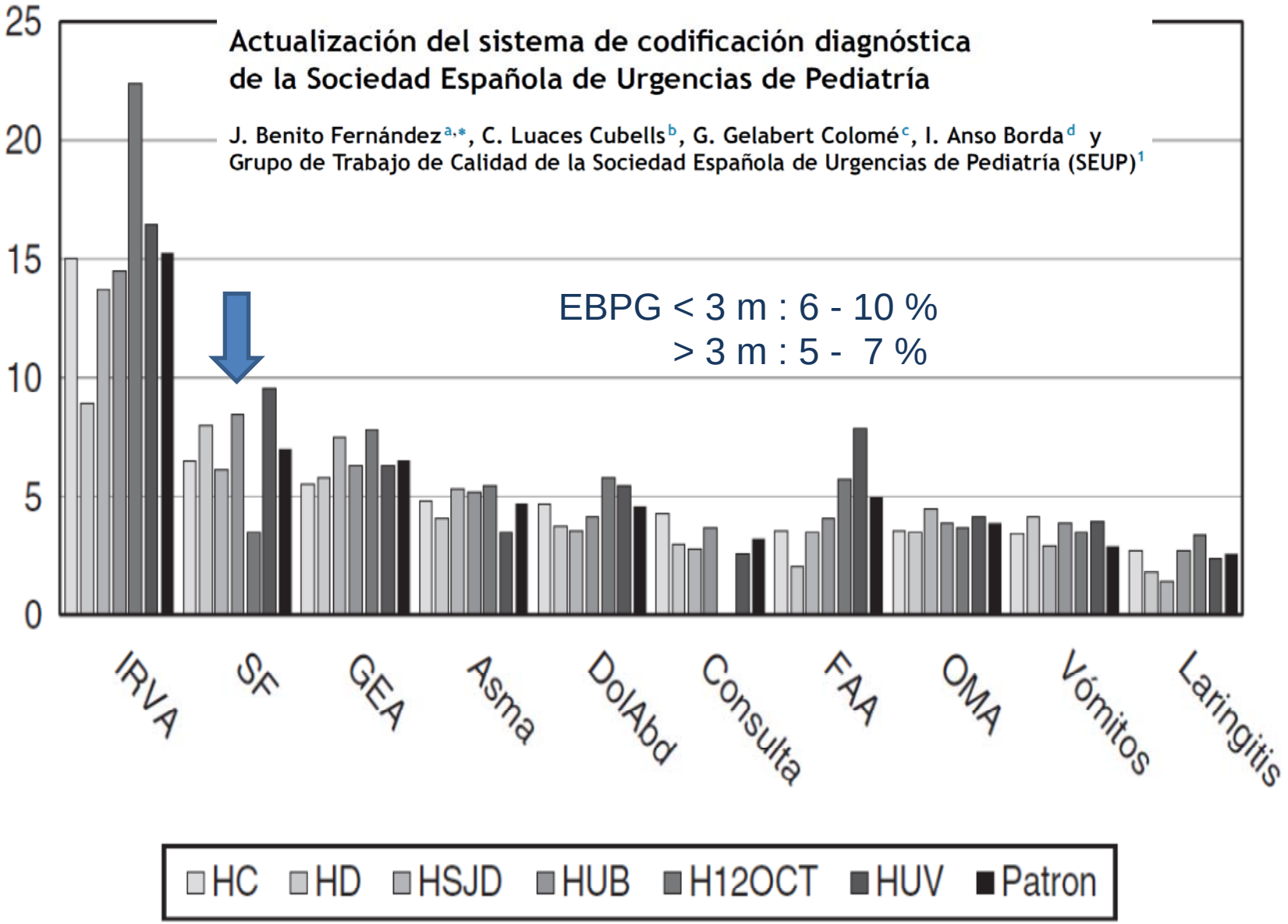
**Profesor Asociado de Pediatría**
**Universitat de Barcelona**

# GUIÓN

- Epidemiología y un poco de historia....
- Algo está cambiando
- El exámen fisico
- Pruebas complementarias
- ¡ Nuevos algortimos ¡
- ¿ Nuevos algoritmos ? ¿Para qué ?
- Pongámonos de acuerdo...
- ¿ Pero...de verdad hacen falta los algoritmos?
- Comentarios / Reflexiones


Actualización del sistema de codificación diagnóstica de la Sociedad Española de Urgencias de Pediatría
J. Benito Fernández[a,*], C. Luaces Cubells[b], G. Gelabert Colomé[c], I. Anso Borda[d] y Grupo de Trabajo de Calidad de la Sociedad Española de Urgencias de Pediatría (SEUP)[1]
EBPG < 3 m : 6 - 10 %
> 3 m : 5 - 7 %
25
20
15
10
5
0
IRVA
SF
GEA
Asma
DolAbd
Consulta
FAA
OMA
Vómitos
Laringitis
HC
HD
HSJD
HUB
H12OCT
HUV
Patron

Cuatro siglos atrás....

"La fiebre es un instrumento de la naturaleza"

Thomas Sydenham (1624 – 1689)

# Un siglo atrás....

"La humanidad tiene tres grandes enemigos: la fiebre, el hambre y la guerra; de ellos por lejos el más grande, por lejos el más terrible, es la fiebre"

Sir William Osler (1849- 1919)

Practice guideline for the management of infants and children 0 to 36 months of age with fever without source

Larry J Baraff, James W Bass, Gary R Fleisher, Jerome O Klein, George H McCracken Jr, Keith R Powell, David L Schriger

**Conclusion:**

These guidelines do not eliminate all risk or strictly confine antibiotic treatment to children likely to have occult bacteremia. Physicians may individualize therapy based on clinical circumstances or adopt a variation of these guidelines based on a different interpretation of the evidence.

**Annals of Emergency Medicine**
**Volume 22, Issue 7, Pages 4-1246 (July 1993)**

# Algoritmos Diagnósticos

**Table 1**
**Commonly used algorithms and pathways for risk stratification in management of febrile infants 3 months of age and younger**

| Low-Risk Criteria | Boston[a] | Philadelphia[a] | Rochester[a] | Pittsburgh Criteria | Boston Predictive Model | Milwaukee[a] Criteria |
|---|---|---|---|---|---|---|
| Age (d) | 28–89 | 29–56 | 0–60 | <60 | <90 | 28–56 |
| Temperature (°C) | ≥38.0 | ≥38.2 | ≥38.0 | >38.0 | >39.6 | ≥38.0 |
| Clinical appearance or YOS | Well | Well | Well | No | No | Well |
| CBC | >5000 or <20,000 | <15,000 | >5000 or <15,000 | >5000 or <15,000 | >20,000 or <40,100 | <15,000 |
| Band counts | NA | <0.2 B:N ratio | <1500 | <1500 | NA | NA |
| UA | <10 WBC/hpf | <10 WBC/hpf | <10 WBC/hpf | Enhanced WBC <9 | >5/Dip(+) | UA <5–10 WBC/hpf (no bacteria, negative LE/nitrite) |
| Urine Gram stain | NA | Yes | NA | Yes | NA | NA |
| CSF | <10 WBC/mm$^3$ | <8 WBC/mm$^3$ | Not required | <5, (–) GM | NA | <10 WBC/mm$^3$ |
| Stools | If diarrhea | If diarrhea | If diarrhea | <5 | NA | NA |
| Chest radiograph | If done | All | If done | Yes | NA | If done |

*Abbreviations:* B:N, Bands: Neutrophil; CBC, complete blood count; CSF, cerebrospinal fluid; GM, gram stain; hpf, high-power field; LE, Leukocyte Esterase; NA, no data available; UA, urinalysis; WBC, white blood cells; YOS, Yale Observational Scale.

[a] Reliable caretaker and follow-up required within 24 hours if patient is discharged home from the ED.

# Algortimo de Baraff (2000)

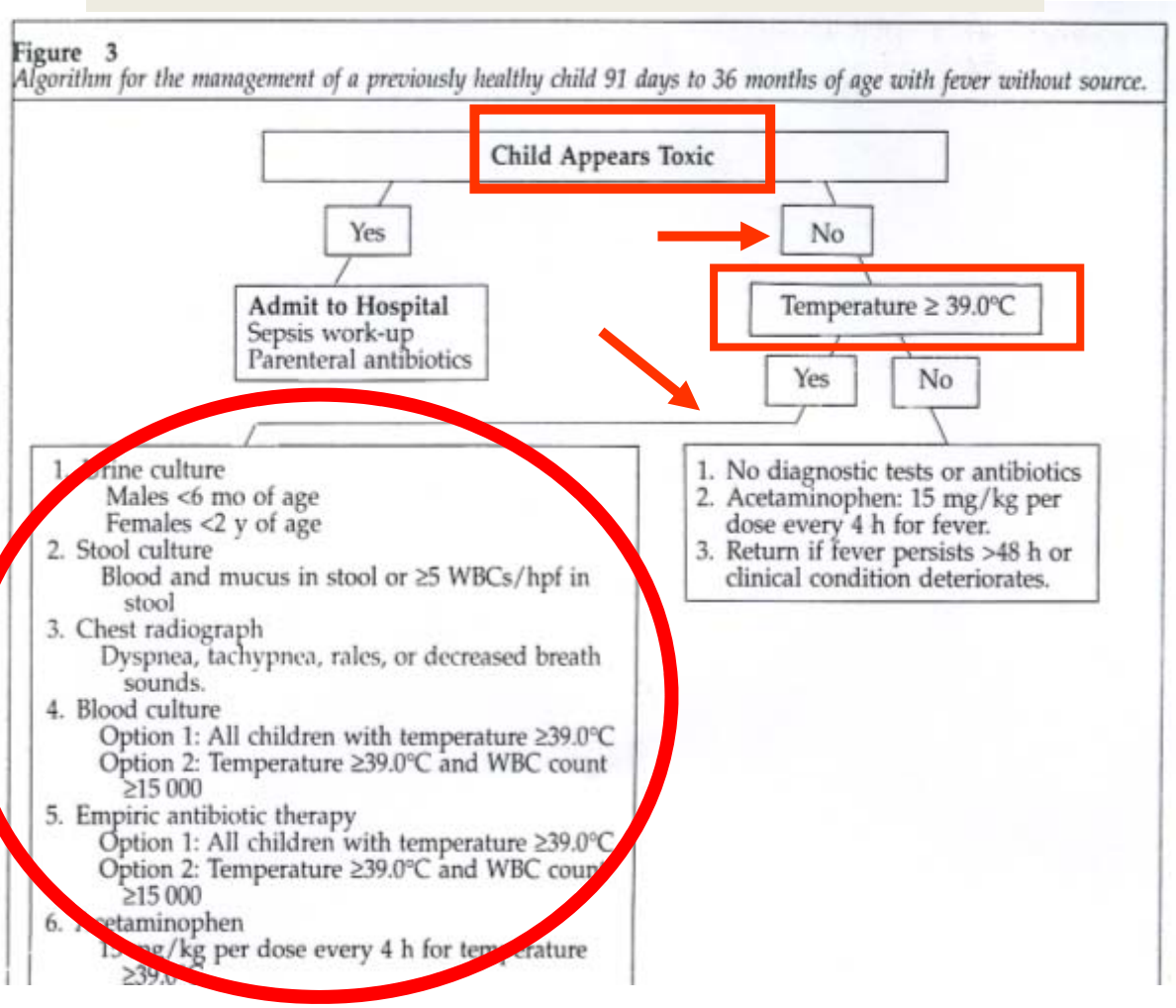


Figure 3
*Algorithm for the management of a previously healthy child 91 days to 36 months of age with fever without source.*

Child Appears Toxic

Yes

Admit to Hospital
Sepsis work-up
Parenteral antibiotics

No

Temperature ≥ 39.0°C

Yes

1. rine culture
   Males <6 mo of age
   Females <2 y of age
2. Stool culture
   Blood and mucus in stool or ≥5 WBCs/hpf in stool
3. Chest radiograph
   Dyspnea, tachypnea, rales, or decreased breath sounds.
4. Blood culture
   Option 1: All children with temperature ≥39.0°C
   Option 2: Temperature ≥39.0°C and WBC count ≥15 000
5. Empiric antibiotic therapy
   Option 1: All children with temperature ≥39.0°C
   Option 2: Temperature ≥39.0°C and WBC coun ≥15 000
6. etaminophen
   g/kg per dose every 4 h for tem erature ≥39.0

No

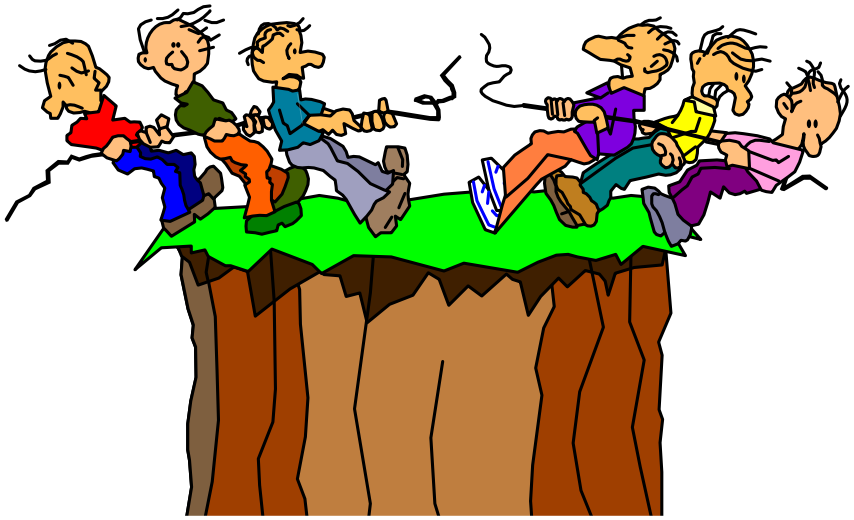
1. No diagnostic tests or antibiotics
2. Acetaminophen: 15 mg/kg per dose every 4 h for fever.
3. Return if fever persists >48 h or clinical condition deteriorates.

Lactante febril……pruebas mil !!!
Lactante febril de madrugada..tiene cama reservada…
y si es de día ….la tiene TODAVIA !!!!
Pou J. Urgencias pediatricas.Hospital Sant Joan de Déu. 1990

# Risk Minimizers vs. Test Minimizers

## "To Test / Treat or Not To Test / Treat"

- Algoritmos publicados
- Riesgo evolucion desfavorable
- Preferencias de los padres



- Coste
- Epidemiología cambiante de la BO
- Riesgo de pruebas y tratamientos
- Preferencias de los niños?


Green SM. Ann Emerg Med 1999; 33: 211.

# Consecuencias negativas de pruebas y tratamiento innecesario

- Ingresos innecesarios
- Dolor por las pruebas
- Coste económico
- Efectos adversos
- Falsos positivos
- Angustia familiar
- Resistencias antibióticas

# El niño febril. Resultados de un estudio multicéntrico

Grupo de Trabajo sobre el Niño Febril. Sociedad Española de Urgencias de Pediatría

*Coordinadores:* J. Pou Fernández, C. Luaces Cubells (Sección de Urgencias. Servicio de Pediatría. Hospital Sant Joan de Déu-Clínic. Barcelona). S. Mintegi Raso (Departamento de Pediatría. Urgencias de Pediatría. Hospital de Cruces. Baracaldo).
*Centros y responsables participantes:* Hospital de Cruces (J. Benito), Hospital de Basurto (J. Humayor), Hospital de Bidasoa (J. Alustiza), Hospital La Paz (J. Martín), Hospital 12 de Octubre (M.J. Martín), Hospital Carlos Haya (A. Jurado, I. Durán), Hospital Marqués de Valdecilla (M.C. Freijo), Hospital Parc Taulí (J. Ramírez), Hospital General de Manresa (J. Sitges), Hospital del Niño Jesús (J.C. Molina), Hospital Sant Joan de Déu (J.J. García).

*(An Esp Pediatr 2001; 55: 5-10)*

## Conclusiones

**La experiencia del pediatra apoyada en parámetros clínicos y analíticos son los argumentos más sólidos para detectar niños febriles (0 a 36 meses) con enfermedad bacteriana potencialmente grave.**

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THE JOURNAL OF PEDIATRICS • www.jpeds.com MEDICAL PROGRESS

# Management of the Non–Toxic-Appearing Acutely Febrile Child: A 21st Century Approach

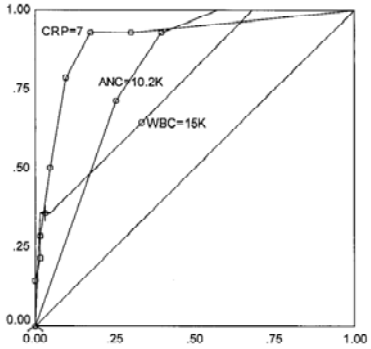
August 2011

Ravi Jhaveri, MD, Carrie L. Byington, MD, Jerome O. Klein, MD, and Eugene D. Shapiro, MD

Table. Rates of OB after the introduction of PCV7

| Reference | Site, years, number of children | Pathogens | Contaminants |
|---|---|---|---|
| Stoll and Rubin[37] | Long Island, 2001-2003; 329 children | 0.9% Sp (3 episodes in 2 patients, 1 unvaccinated) | 1.2% |
| Carstairs et al[38] | San Diego, 2000-2002; 1383 children | 0% after PCV7; 2.4% with no PCV7 (1% of overall) | 3% |
| Sard et al[39] | Boston, 1997-2005; 2971 children | 0.7% overall (0.45% Sp) | 2.8% |
| Waddle and Jhaveri[40] | Durham, 1997-1999; 2001-2004; 423 children | 6.7% pre-PCV7; 0.4% post-PCV7; 4% vs 0% Sp | 4.7% |
| Wilkinson et al[41] | Phoenix, 2004-2007; 8408 children | 0.25% Sp | 1.89% |

# C-Reactive Protein in Febrile Children 1 to 36 Months of Age With Clinically Undetectable Serious Bacterial Infection




PEDIATRICS Vol. 108 No. 6 December 2001

# Biomarcadores

**TABLE 1.** Characteristics of Children With and Without SBI

| Characteristic* | Patients With SBI ($n$ = 14) | Patients Without SBI ($n$ = 63) | $P$ Value |
|---|---|---|---|
| Age (mo) | 10.6 (9.3) | 9.5 (7.8) | .64 |
| Sex (% female) | 71.4 | 52.4 | .19 |
| Temperature in ED (°C) | 39.5 (0.74) | 39.5 (0.73) | .99 |
| Duration of fever, median (range), h | 24 (3, 168) | 24 (1, 168) | .24 |
| Total YOS | 8.9 (3.8) | 8.6 (3.8) | .77 |
| WBC (thousand/mm$^3$) | 22.3 (9.8) | 12.5 (7.0) | .003 |
| Polymorphonuclear cells (%) | 56.3 (7.6) | 52.5 (15.3) | .19 |
| Band count (%) | 5.7 (5.8) | 3.6 (4.2) | .11 |
| ANC (thousand/mm$^3$) | 13.9 (6.1) | 7.3 (5.4) | <.0001 |
| CRP concentration, median (range) mg/dL | 9.7 (0.2, 37.2) | 1.0 (0.2, 20.7) | .002 |

# PCT en urgencias pediátricas

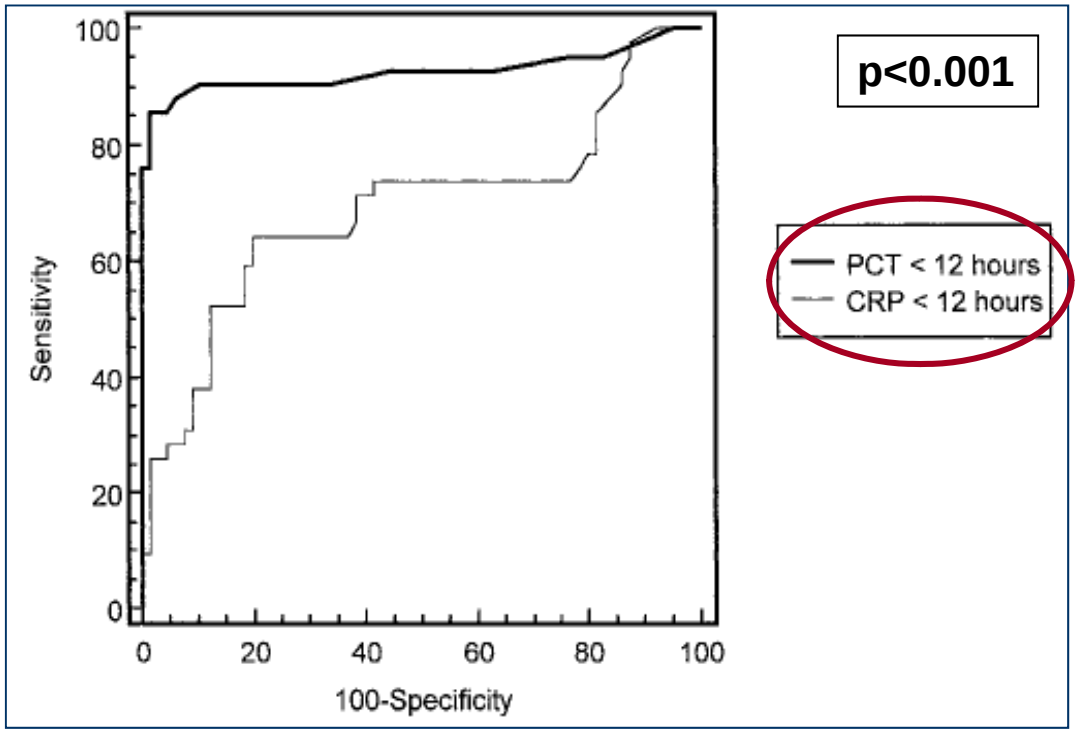
Pediatr Infect Dis J, 2003;22:895–903

## Procalcitonin in pediatric emergency departments for the early diagnosis of invasive bacterial infections in febrile infants: results of a multicenter study and utility of a rapid qualitative test for this marker

ANNA FERNÁNDEZ LÓPEZ, MD, C. LUACES CUBELLS, MD, J. J. GARCÍA GARCÍA, MD, J. FERNÁNDEZ POU, MD
AND THE SPANISH SOCIETY OF PEDIATRIC EMERGENCIES

- Coordination of study:
  Hospital Universitario Sant Joan de Déu. Barcelona.
- Hospitals:
  Hospital de Cruces. Vizcaya.
  Hospital General de Asturias. Oviedo.
  Hospital Universitario Gregorio Marañón. Madrid.
  Hospital Infantil Niño Jesús. Madrid.
  Hospital Universitario Vall d'Hebró. Barcelona.
  Hospital Universitario La Fe. Valencia.
  Hospital Infantil La Paz. Madrid.
  Hospital 9 de Octubre. Valencia.

# Utilidad de PCT en urgencias pediátricas




| | PCT | CRP |
|---|---|---|
| Area | 0.93 (0.03) | 0.69 (0.05) |

Optimal cut-off PCT: > 0.69 ng/mL
Sensitivity: 85.7 % PPV: 96.9 %
Specificity: 98.5 % NPV: 89.7 %

Optimal cut-off CRP: > 19 mg/L
Sensitivity: 61.3 % PPV: 65.8 %
Specificity: 80 % NPV: 76.5 %

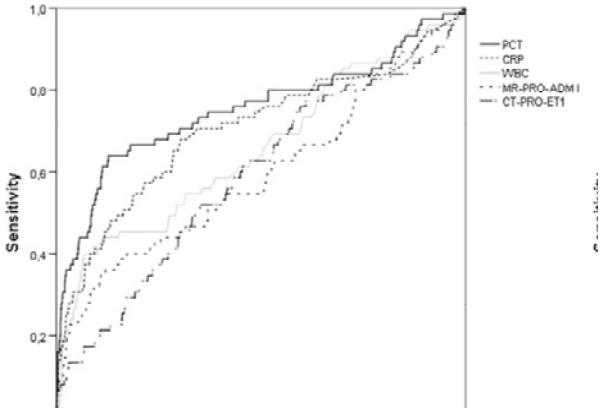
FIG. 4. ROC curves for CRP and PCT for differentiation between invasive (Group 3) and noninvasive (Groups 1 + 2) infections in infants with fever evolution of <12 h. *PPV,* positive predictive value; *NPV,* negative predictive value.

Pediatr Infect Dis J, 2003;22:895–903

# Lack of value of midregional pro-adrenomedullin and C-terminal pro-endothelin-1 for prediction of severe bacterial infections in infants with fever without a source

Javier Benito · Carlos Luaces-Cubells · Santiago Mintegi · Eider Astobiza · Lorea Martinez-Indart · Ana Valls-Lafont · Juan-José García-García

Eur J Pediatr 2013




| Variables | Area under the curve | 95% CI | |
|---|---|---|---|
| | | Lower limit | Upper limit |
| PCT | 0.75 | 0.68 | 0.82 |
| CRP | 0.70 | 0.63 | 0.77 |
| WBC | 0.65 | 0.58 | 0.73 |
| MR-pro-ADM | 0.59 | 0.52 | 0.67 |
| CT-pro-ET1 | 0.58 | 0.51 | 0.66 |

# Occult Bacteremia From a Pediatric Emergency Department: Current Prevalence, Time to Detection, and Outcome

Elizabeth R. Alpern, MD, MSCE*; Evaline A. Alessandrini, MD, MSCE*; Louis M. Bell, MD*‡; Kathy N. Shaw, MD, MSCE*; and Karin L. McGowan, PhD‡

*Pediatrics* 2000;106:505–511;

96 % de EI por HiB (1987)

Vacunas

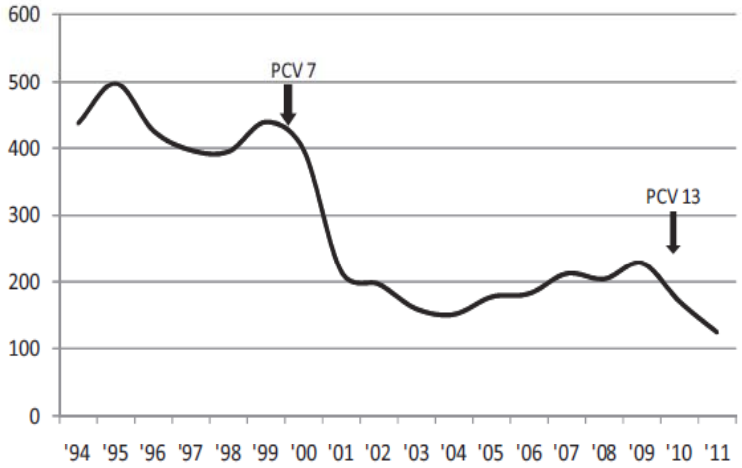
**TABLE 1.** ria in Children 2 to 24 Months of l*

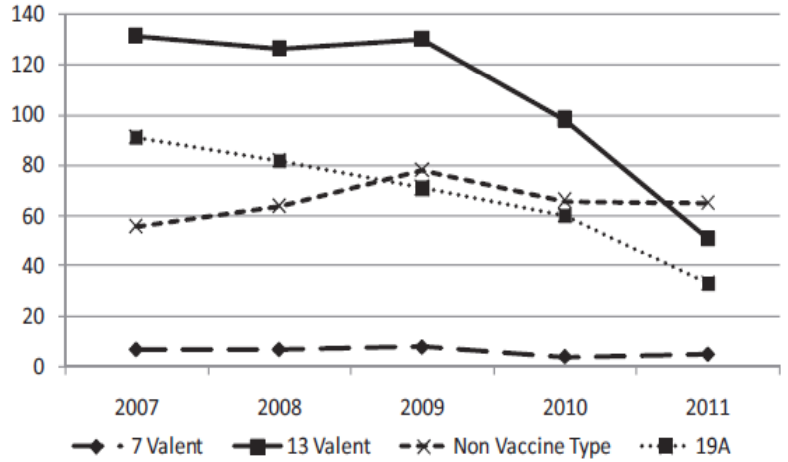
| Pathogenic Bacteria | Frequency | Percentage |
|---|---|---|
| *S pneumoniae* | 92 | 82.9% |
| *Salmonella* sp | 6 | 5.4% |
| Group A streptococci | 5 | 4.5% |
| *Enterococcus* sp | 2 | 1.8% |
| *Moraxella catarrhalis* | 2 | 1.8% |
| Coagulase-positive staphylococci | 2 | 1.8% |
| *Escherichia coli* | 1 | .9% |
| *Campylobacter* sp | 1 | .9% |

* This represents 1.9% (95% CI: 1.5%–2.3%) of the study cohort of 5901 children (see text).

# Early Trends for Invasive Pneumococcal Infections in Children After the Introduction of the 13-valent Pneumococcal Conjugate Vaccine

*Sheldon L. Kaplan, MD,* William J. Barson, MD,† Philana Ling Lin, MD,‡ José R. Romero, MD,§ John S. Bradley, MD,¶ Tina Q. Tan, MD,‖ Jill A. Hoffman, MD,** Laurence B. Givner, MD,†† and Edward O. Mason, Jr., PhD**




*The Pediatric Infectious Disease Journal* • Volume 32, Number 3, March 2013

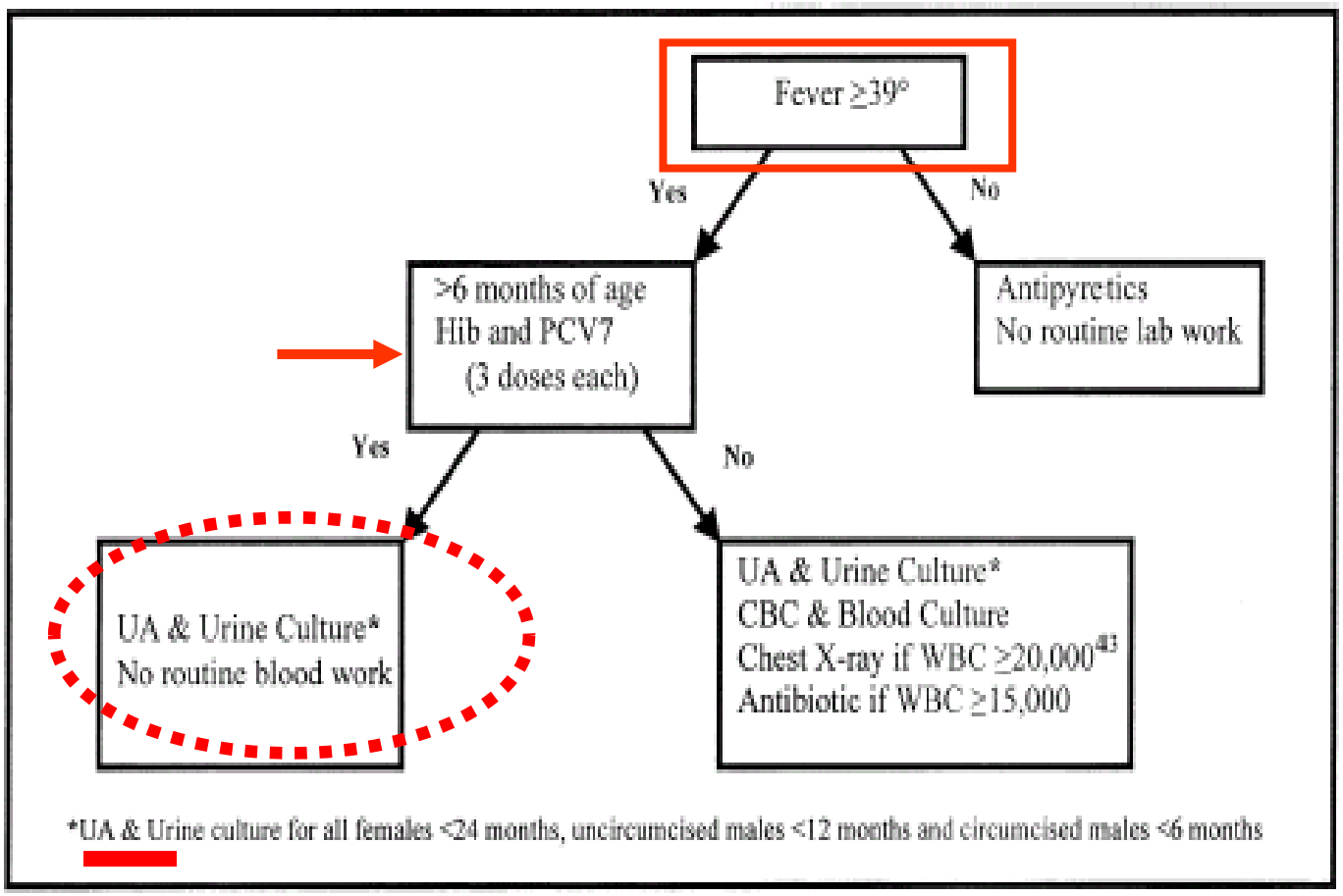



Figure 1. The current management guideline for well-appearing febrile infants aged 3 to 36 months without focal source of infection as practiced at Children's Hospital Boston's Emergency Department.

" En el niño mayor de seis meses y fiebre < 39,5° no es imprescindible la realización de hemograma si ha recibido tres dosis de vacuna antineumocócica"

Nigrovic et al Clin Ped Emerg Med 2004;5:13 –19

# Impacto de la vacunación neumocócica en el manejo del lactante con fiebre, en relación al porcentaje de vacunación

S. Capapé Zache[a], C. Luaces Cubells[b], R. Garrido Romero[b], G. Claret Teruel[b], A. Fernández Landaluce[a] y J. Benito Fernández[a]

Urgencias de Pediatría. [a]Hospital de Cruces. Baracaldo. [b]Agrupació Sanitária Hospital Sant Joan de Déu-Clínic. Universitat de Barcelona. España.

TABLA 3. **Resultados pruebas complementarias en caso clínico 1 en relación a la VCN-7 comparando grupo A (VCN-7 ≥ 40 %) frente a grupo B (VCN-7 < 40)**

| Caso 1 | Grupo A: VCN-7 ≥ 40 % (n = 104) | | | Grupo B: VCN-7 < 40 % (n = 131) | | |
|---|---|---|---|---|---|---|
| | No VCN-7 | VCN-7 | p | No VCN-7 | VCN-7 | p |
| Hemograma | 87 (83,7%)* | 28 (26,9%)* | < 0,001 | 91 (69,5%)* | 56 (42,7%)* | < 0,001 |
| Hemocultivo | 83 (79,8%)* | 25 (24%) | < 0,001 | 76 (58%)* | 41 (31,3%) | < 0,001 |
| Orina | 40 (38,5%)* | 33 (31,7%) | NS | 32 (24,4%)* | 32 (24,4%) | NS |
| Urocultivo | 20 (19,2%) | 16 (15,4%) | NS | 29 (22,1%) | 28 (21,4%) | NS |
| Radiografía | 32 (30,8%) | 18 (17,3%) | 0,02 | 39 (29,8%) | 29 (22,1%) | NS |
| Punción lumbar | 3 (2,9%) | 1 (1%) | NS | 5 (3,8%) | 2 (1,5%) | NS |
| No pruebas | 12 (11,5%)* | 47 (45,1%) | < 0,001 | 34 (26%)* | 57 (43,5%) | < 0,001 |

*Diferencias significativas (p < 0,05) entre ambos grupos.

VCN-7: vacunación neumocócica conjugada heptavalente; NS: no significativo.

An Pediatr (Barc). 2007;67(1):30-6

## Low prevalence of invasive bacterial infection in febrile infants under 3 months of age with enterovirus infection

A. Martínez Planas[1], C. Muñoz Almagro[2], C. Luaces Cubells[3], A. Noguera Julián[1], L. Selva[2], J. Pou Fernández[1] and J. J. García García[1]

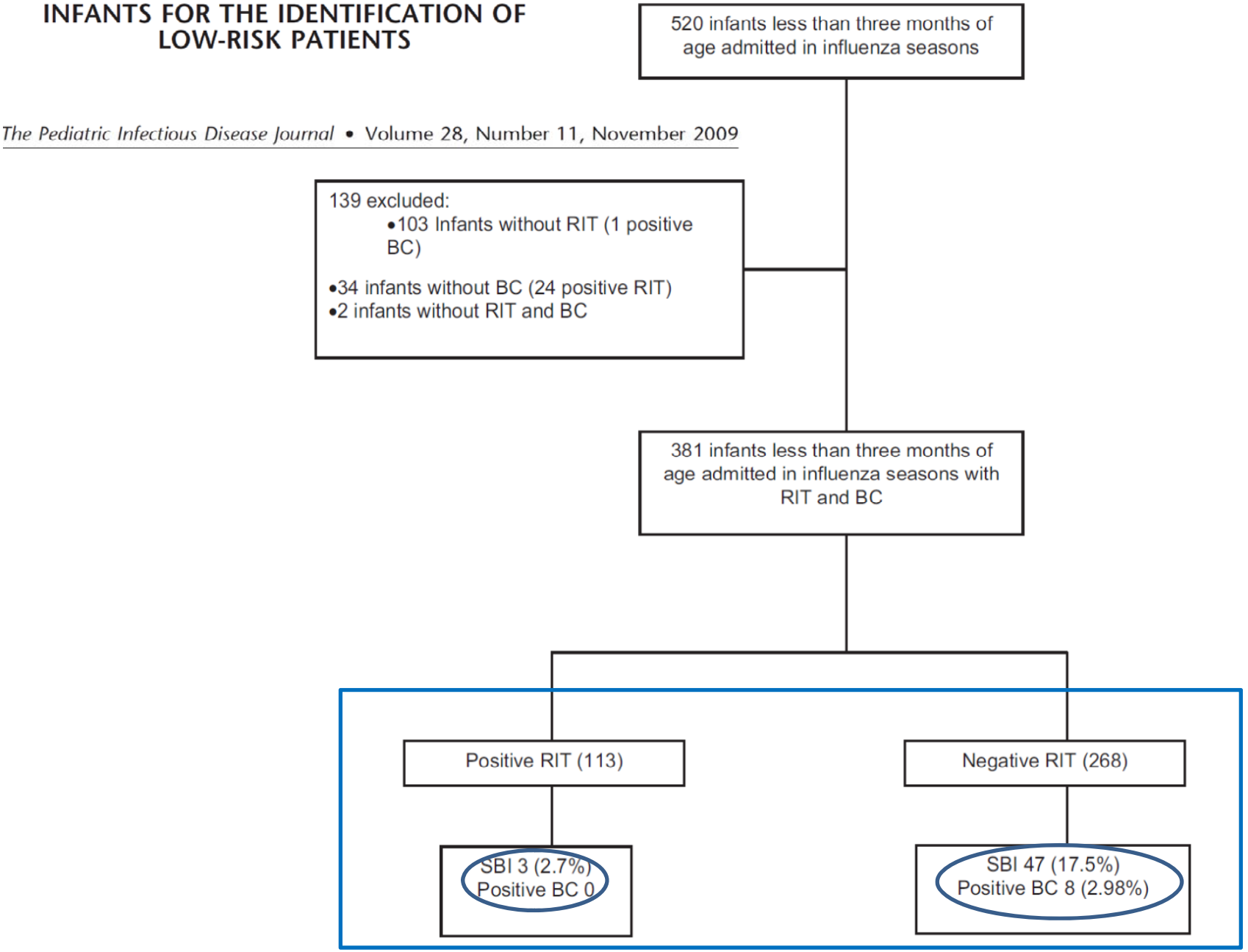
# Test de Diagnóstico Rápido

| Diagnosis | *n* = 381 | EV– (*n* = 317) | EV+ (*n* = 64) |
|---|---|---|---|
| Invasive bacterial infection | | | |
| Urinary tract infection | 65 | 64 | 1 |
| Sepsis[a] | 7 | 7 | 0 |
| Pneumonia | 4 | 4 | 0 |
| Acute gastroenteritis[b] | 4 | 4 | 0 |
| Cutaneous cellulitis | 1 | 1 | 0 |
| Non-invasive bacterial infections: viral or presumable viral infections | | | |
| Febrile syndrome without source | 174 | 149 | 25 |
| Aseptic meningitis | 39 | 7 | 32 |
| Acute gastroenteritis | 27 | 24 | 3 |
| Upper respiratory tract infection | 24 | 22 | 2 |
| Acute otitis media | 15 | 15 | 0 |
| Flu[c] | 12 | 11 | 1 |
| Bronchiolitis[d] | 10 | 10 | 0 |

[a] *Streptococcus agalactiae* (*n* = 6) and *Escherichia coli*, one patient.
[b] Rotavirus (*n* = 4), *Campylobacter jejunii* and *Salmonella enteritidis* (two cases each).
[c] Influenza type A (*n* = 10) and B (*n* = 2).
[d] Respiratory syncitial virus detected in six cases.

# RAPID INFLUENZA TEST IN YOUNG FEBRILE INFANTS FOR THE IDENTIFICATION OF LOW-RISK PATIENTS

*The Pediatric Infectious Disease Journal* • Volume 28, Number 11, November 2009



TECHNICAL REPORT

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

PEDIATRICS Volume 135, number 1, January 2015

# Patient- and Family-Centered Care of Children in the Emergency Department

Nanette Dudley, MD, Alice Ackerman, MD, MBA, Kathleen M. Brown, MD, Sally K. Snow, BSN, RN,
American Academy of Pediatrics Committee on Pediatric Emergency Medicine,
American College of Emergency Physicians Pediatric Emergency Medicine Committee,
Emergency Nurses Association Pediatric Committee

decision.

**Fever Phobia: A Survey of Caregivers of Children Seen in a Pediatric Emergency Department**

*Clinical Pediatrics 49(6)*

2010

**Table 2.** Caregiver Responses to Questions Regarding Fever Consequences and Treatments

| | Percentage Response |
|---|---|
| Principle danger of fever | |
| Seizure | 32 |
| Death | 18 |
| Other | 17 |
| Brain damage | 15 |
| Passing out | 6 |
| Don't know | 5 |
| Infections | 3 |
| Shock | 2.2 |
| Blindness | 1.9 |
| Temperature-taking method | |
| By mouth | 60 |
| Rectally | 49.6 |
| Under arm | 47.4 |
| By ear | 17.4 |
| By touch | 7.4 |
| Other | 6.1 |
| Sponging method | |
| Cold water | 30.9 |
| Warm water | 30.9 |
| Alcohol | 9.1 |
| Other | 1.3 |
| Hot water | 0 |


A veces los cambios son sutiles.....


Y otras.....MUY EVIDENTES

# GUIÓN

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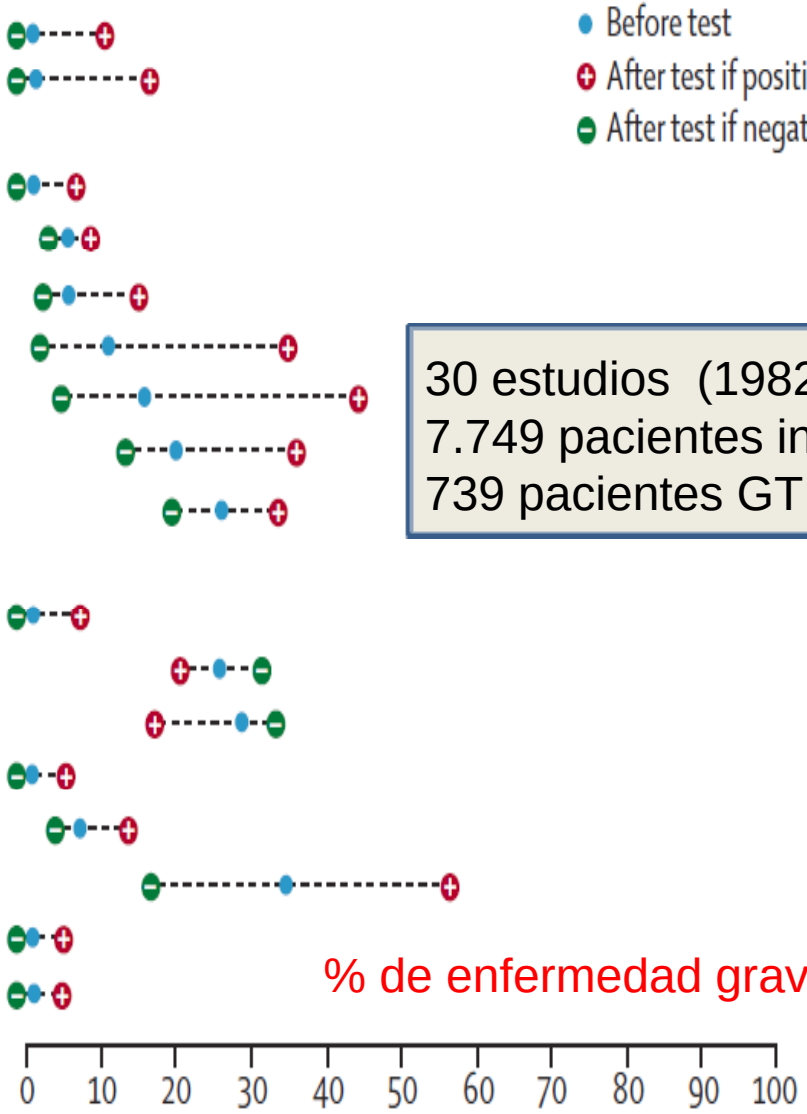
- ¿ Pero...de verdad hacen falta los algoritmos?

## Potential warning signs for serious illness

Diagnostic value of clinical features at presentation to identify serious infection in children in developed countries: a systematic review

Lancet 2010; 375: 834–45




30 estudios (1982 – 2008)
7.749 pacientes incluidos
739 pacientes GT SEUP

# Clinical decision rules with the potential to rule in or rule out serious infection

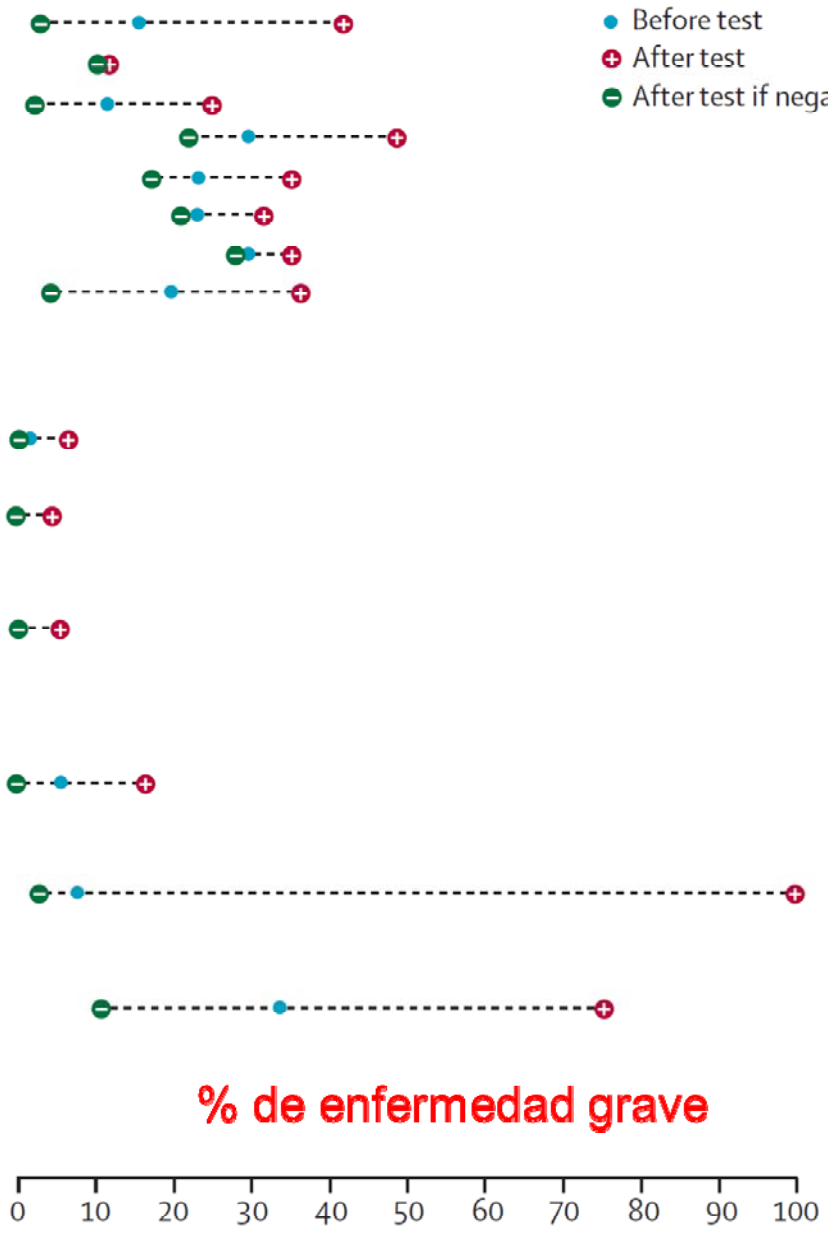
**All serious infections**
Yale Observation Scale†

Yale Observation Scale or any normal finding in history or physical examination
Five-stage decision tree‡

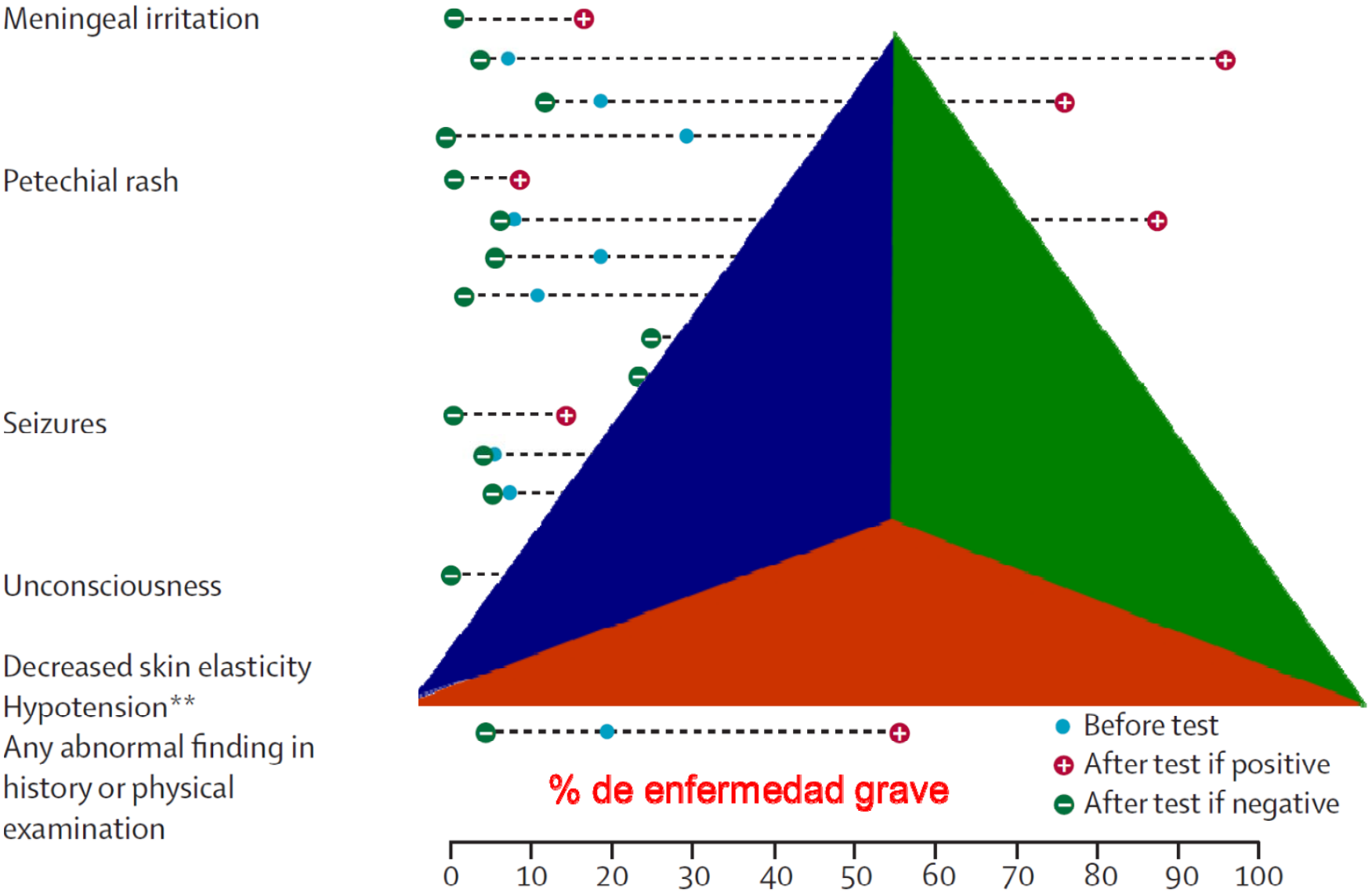
**Pneumonia**
Short of breath and parent concerned illness different
Short of breath and clinician concerned something is wrong

**Meningitis**
Any abnormal neurological finding or sought care <48 h§
Petechiae or nuchal rigidity or coma

**Dehydration from gastroenteritis**
Any two of:
absent tears, dry mucous membranes, ill appearance, poor peripheral circulation



# Potential warning signs for serious illness



# Clinicians' gut feeling about serious infections in children: observational study

*BMJ* 2012;345:e6144 doi: 10.1136/bmj.e6144

"instinto clínico"

Table 1| Diagnostic characteristics of clinicians' gut feeling that something is wrong in children presenting to primary care

| Variables | Serious infection | Non-serious infection | Sensitivity (%) | Specificity (%) | Predictive values (%) | Positive likelihood ratio |
|---|---|---|---|---|---|---|
| All children presenting to primary care (n=3890) | | | | | | |
| Gut feeling: | | | | | | |
| Present | 13 | 107 | 61.9 | 97.2 | Positive: 10.8, negative: 99.8 | 22.4 |
| Absent | 8 | 3762 | | | | |
| Children in whom clinical impression was of a non-serious illness (n=3369)* | | | | | | |
| Gut feeling: | | | | | | |
| Present | 2 | 44 | 33.3 | 98.7 | Positive: 4.4, negative: 99.9 | 25.5 |
| Absent | 4 | 3319 | | | | |

*Excludes children with clinical impression of serious illness (n=294) or for whom information on clinical impression was missing (n=227).

RESEARCH ARTICLE Open Access

How well do clinical prediction rules perform in identifying serious infections in acutely ill children across an international network of ambulatory care datasets?

4 algoritmos manejo
3 GPC
Inglaterra, Holanda, Bélgica
11. 023 pacientes

*BMC Medicine* 2013, **11**:10

## Conclusions

None of the CPRs examined in this study provided perfect diagnostic accuracy. In LP settings (for example, PC) or IP settings, prediction rules, such as the FSDT and evidence-based guidelines (NICE guideline and the NHG alarm symptoms) had high sensitivity, providing promising rule-out value for serious infections in these datasets, although all seemed to leave residual uncertainty. Additional clinical assessment or testing such as point-of-care inflammatory markers may be needed to increase clinical certainty. None of the prediction rules identified seemed to be valuable for HP settings (for example, EDs).

# GUIÓN

- Epidemiología y un poco de historia....
- Algo está cambiando
- El exámen fisico
- Pruebas complementarias
- ¡ Nuevos algortimos ¡
- ¿ Nuevos algoritmos ? ¿Para qué ?
- Pongámonos de acuerdo...
- ¿ Pero...de verdad hacen falta los algoritmos?

# Diagnostic value of laboratory tests in identifying serious infections in febrile children: systematic review

The best performing clinical decision rule (recently validated in an independent dataset) combines testing for C reactive protein, procalcitonin, and urinalysis and has a positive likelihood ratio of 4.92 (3.26 to 7.43) and a negative likelihood ratio of 0.07 (0.02 to 0.27).

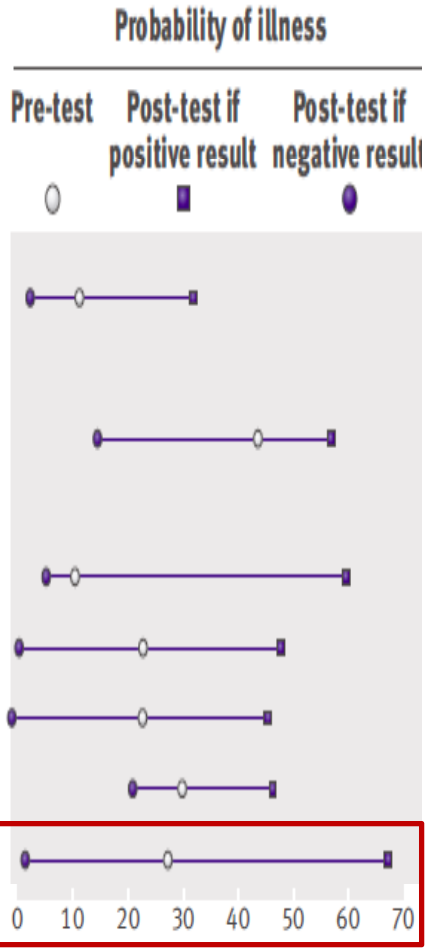
*BMJ* 2011;342:d3082

# Diagnostic value of laboratory tests in identifying serious infections in febrile children: systematic review

*BMJ* 2011;342:d3082

Ann Van den Bruel, academic clinical lecturer,[1] Matthew J Thompson, associate professor,[1,2] Tanya Haj-Hassan, medical student,[3] Richard Stevens, senior statistician,[1] Henriette Moll, professor,[4] Monica Lakhanpaul, senior lecturer,[5] David Mant, emeritus professor[1]

| Study | Tests included in rule | Likelihood ratio (95% CI) Positive | Likelihood ratio (95% CI) Negative |
|---|---|---|---|
| Rules with blood tests only | | | |
| Bleeker[17]* | White blood cell count, serum C reactive protein, white blood cell count in dipstick urinalysis | 3.36 (2.35 to 4.80) | 0.32 (0.16 to 0.65) |
| Bleeker[17]† | White blood cell count, serum C reactive protein, white blood cell count in dipstick urinalysis | 1.61 (1.33 to 1.95) | 0.24 (0.12 to 0.48) |
| Thayyil[14] | Procalcitonin, C reactive protein, and white blood cell count | 10.67 (2.90 to 39.30) | 0.52 (0.26 to 1.05) |
| Galetto-Lacour[19] | Procalcitonin and C reactive protein | 2.89 (2.16 to 3.87) | 0.05 (0.01 to 0.37) |
| Galetto-Lacour[19] | Procalcitonin and white blood cell count | 2.61 (2.01 to 3.39) | 0.00 (0.00 to 0.43) |
| Galetto-Lacour[20] | White blood cell count or band count | 1.93 (1.18 to 3.17) | 0.63 (0.41 to 0.96) |
| Galetto-Lacour[21] | Procalcitonin, C reactive protein, and dipstick urinalysis | 4.92 (3.26 to 7.43) | 0.07 (0.02 to 0.27) |



# GUIÓN

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# Performance of Low-Risk Criteria in the Evaluation of Young Infants With Fever: Review of the Literature

*Pediatrics* 2010;125:228–233

21 estudios; 8.540 pacientes < 90 dias; 3.984 de bajo riesgo

2.23 % de EBPG en pacientes de bajo riesgo (global)

0.67* % vs 2.71 %; p=.01

* % de EBPG en pacientes de bajo riesgo en diseño prospectivo y sin antibioticos

**WHAT'S KNOWN ON THIS SUBJECT:** Fever in neonates is common. The rate of SBIs in young infants may be as high as 12%. Low-risk criteria have been developed to aid in management decisions for well-appearing, febrile young infants.

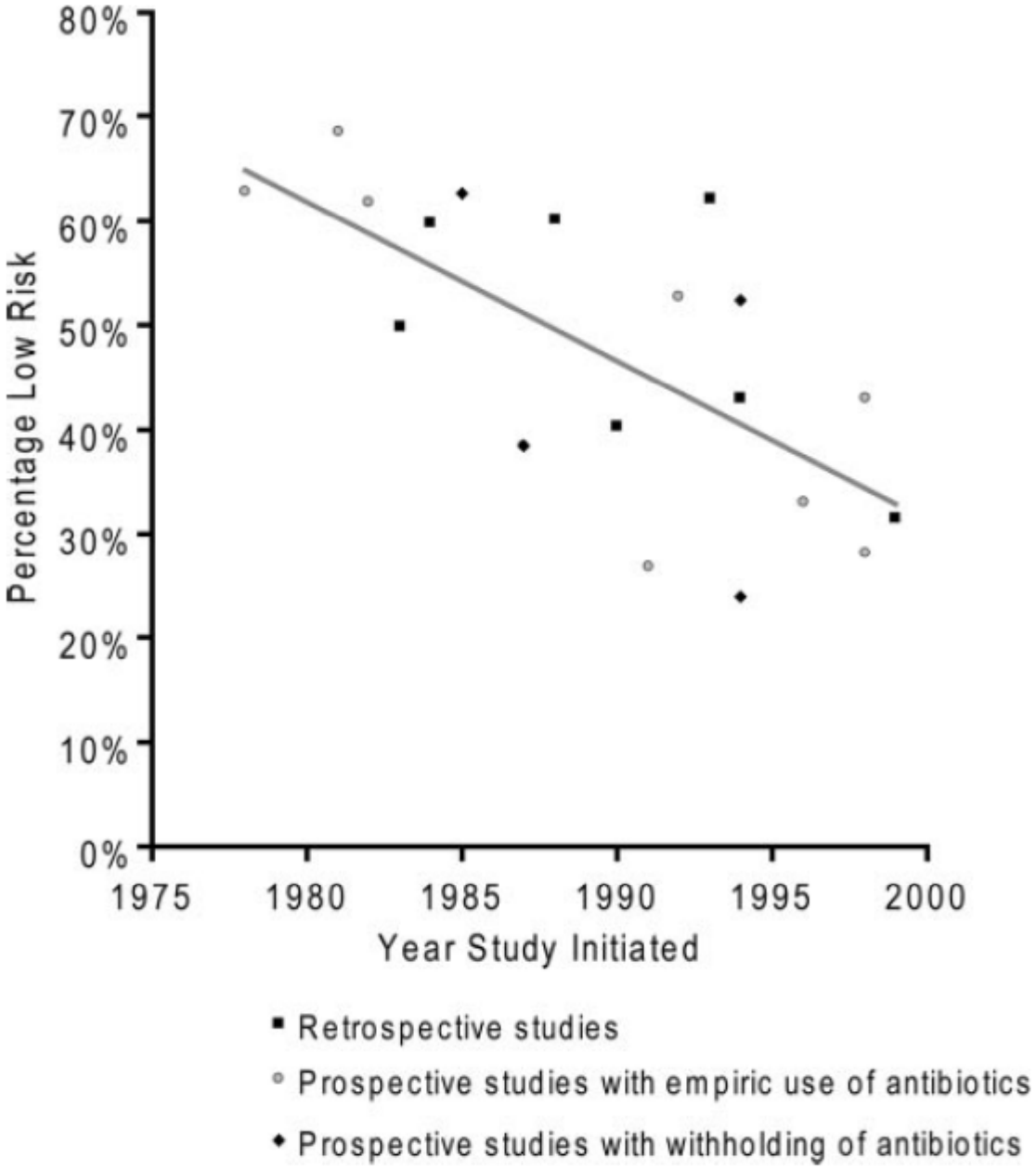
**WHAT THIS STUDY ADDS:** Although the total risk of SBI in febrile young infants in this review was 10.9%, low-risk criteria allowed 30% of these patients to be treated safely without empiric antibiotic therapy.

# Performance of Low-Risk Criteria in the Evaluation of Young Infants With Fever: Review of the Literature

**TABLE 6** Comparison of Performance of Low-Risk Criteria for SBIs in Young Infants, According to Study Design

| Type of Study | Total No. of Patients | No. of Patients With SBIs | No. of High-Risk Patients | Pooled Rate of SBIs in High-Risk Patients, Estimate (95% CI), %[a] | No. of Low-Risk Patients | Pooled Rate of SBIs in Low-Risk Patients, Estimate (95% CI), %[a] | RR of SBI in High-Risk vs Low-Risk Patients (95% CI) |
|---|---|---|---|---|---|---|---|
| Prospective, no antibiotic treatment | 1858 | 174 | 988 | 20.6 (9.4–31.8) | 870 | 0.67 (−0.04–1.30) | 30.56 (7.0–68.13) |
| Prospective, empiric antibiotic treatment | 4481 | 497 | 2469 | 23.8 (13.4–34.1) | 2012 | 2.71 (0.93–4.50) | 8.75 (2.29–15.21) |
| Retrospective | 2201 | 260 | 1099 | 19.8 (14.5–25.1) | 1102 | 2.70 (0.40–5.02) | 6.93 (3.10–10.75) |
| Retrospective and prospective, empiric antibiotic treatment | 6682 | 757 | 3568 | 22.3 (15.8–28.3) | 3114 | 2.71 (1.4–4.0) | 7.74 (3.82–11.67) |

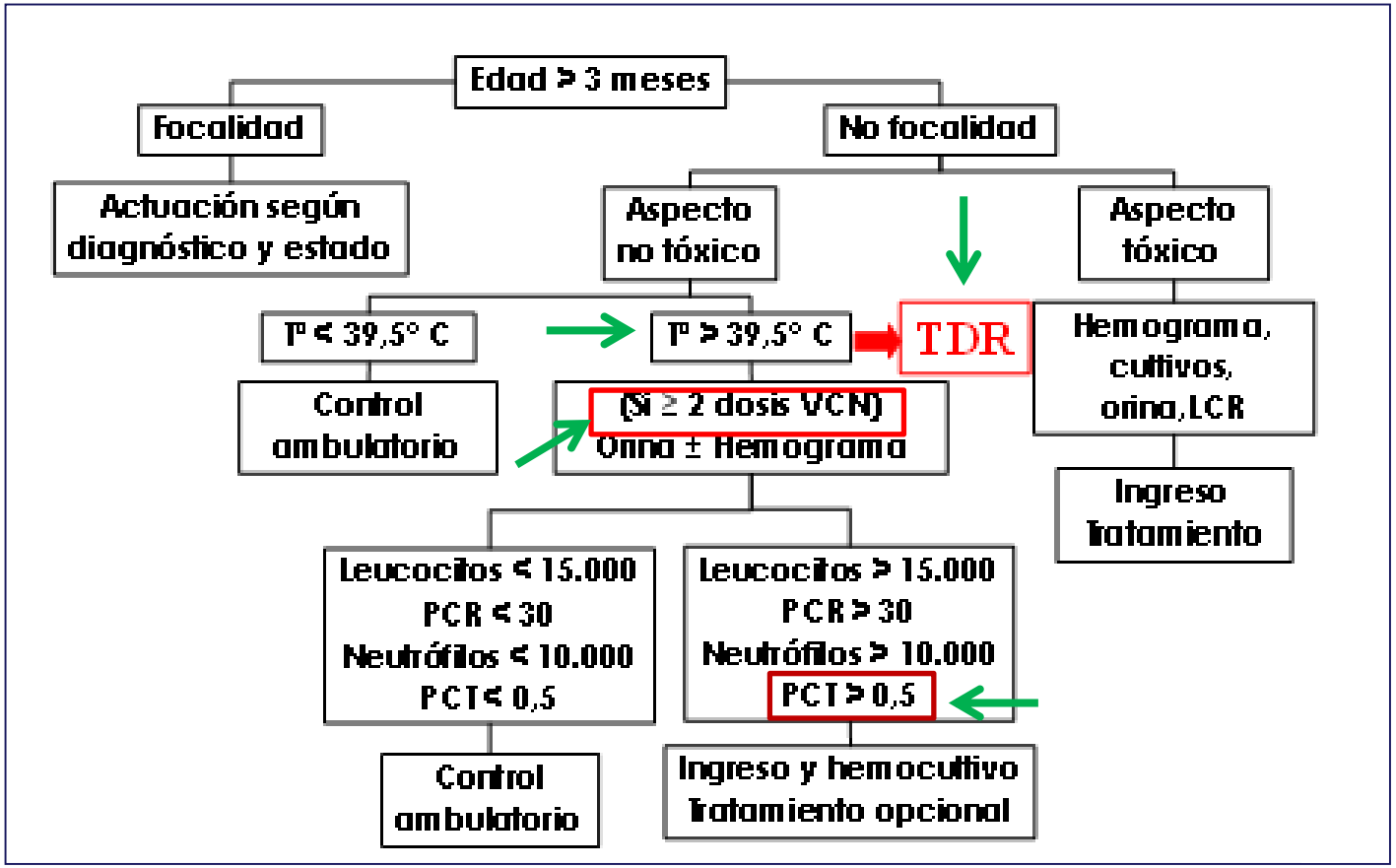
[a] Estimated by using the $\beta$-binomial model for overdispersed data.[29]


80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentage Low Risk
1975
1980
1985
1990
1995
2000
Year Study Initiated
Retrospective studies
Prospective studies with empiric use of antibiotics
Prospective studies with withholding of antibiotics

Bajo riesgo

# Algoritmo fiebre sin foco 3-36 meses edad

Actitud práctica ante el niño con fiebre mayor de 3 meses de edad




TDR: (Test de diagnóstico rápido).

*** Garrido R, Luaces C. Lactante con fiebre sin focalidad. En: Tratado de Urgencias en Pediatría. Publicación de la SEUP. 2ª Edición 2010.**

Validation of a laboratory risk index score for the identification of severe bacterial infection in children with fever without source

*Arch Dis Child* published online June 1, 2010

**Table 1** Lab-score

| Predictor | Points |
|---|---|
| PCT (ng/ml) | |
| <0.5 | 0 |
| ≥0.5 | 2 |
| ≥2 | 4 |
| CRP (mg/l) | |
| <40 | 0 |
| 40–99 | 2 |
| ≥100 | 4 |
| Urine dipstick* | |
| Negative | 0 |
| Positive | 1 |

*Positive urine dipstick: positive leucocytes esterase or nitrite test result.
CRP, C reactive protein; PCT, procalcitonin.

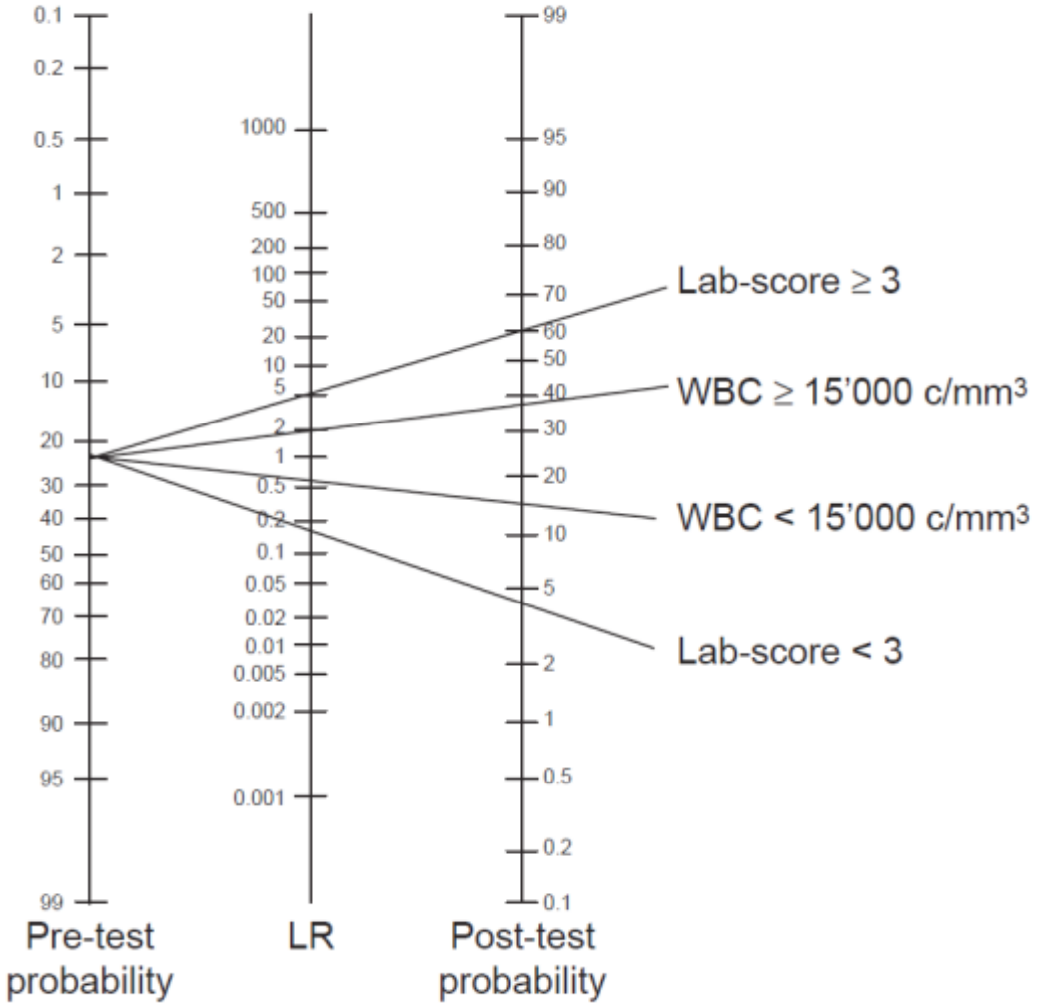


**Table 3** Sensitivity, specificity, positive and negative predictive and likelihood ratio values of the Lab-Score, WBC, CRP and PCT for SBI detection

| | Sensitivity (95% CI) | Specificity (95% CI) | PPV (95% CI) | NPV (95% CI) | LR+ (95% CI) | LR– (95% CI) |
|---|---|---|---|---|---|---|
| Lab-score*(3) (*n*=406) | 86 (77 to 92) | 83 (79 to 87) | 60 (51 to 68) | 95 (92 to 97) | 5.1 (3.9 to 6.6) | 0.17 (0.10 to 0.28) |
| <3 months (*n*=106) | 78 (59 to 89) | 90 (81 to 95) | 72 (54 to 85) | 92 (84 to 96) | 7.7 (3.9 to 15.3) | 0.25(0.12 to 0.50) |
| 3–12 months (*n*=138) | 79 (62 to 90) | 85 (78 to 91) | 59 (43 to 73) | 94 (87 to 97) | 5.4 (3.3 to 8.8) | 0.24(0.12 to 0.50) |
| >12 months (*n*=162) | 97 (86 to 100) | 77 (69 to 84) | 55 (43 to 67) | 99 (94 to 100) | 4.2 (3.1 to 5.8) | 0.04(0.01 to 0.25) |
| WBC*(15 000 cells/mm$^3$) | 52 (42 to 62) | 75 (70 to 80) | 38 (30 to 47) | 84 (80 to 88) | 2.1 (1.6 to 2.7) | 0.64(0.52 to 0.80) |
| CRP*(40 mg/l) | 73 (63 to 81) | 81 (77 to 85) | 53 (45 to 62) | 91 (87 to 94) | 3.8 (3.0 to 5.0) | 0.34(0.24 to 0.47) |
| PCT*(0.5 ng/ml) | 75 (65 to 83) | 76 (71 to 81) | 48 (40 to 56) | 91 (87 to 94) | 3.1 (2.5 to 4.0) | 0.33(0.23 to 0.47) |

*Cut-off level.

CRP, C reactive protein; LR, likelihood ratio; NPV, negative predictive value; PCT, procalcitonin; PPV, positive predictive value; WBC, white blood cell count.

Mintegi S, *et al*. *Emerg Med J* 2013;

Accuracy of a sequential approach to identify young febrile infants at low risk for invasive bacterial infection

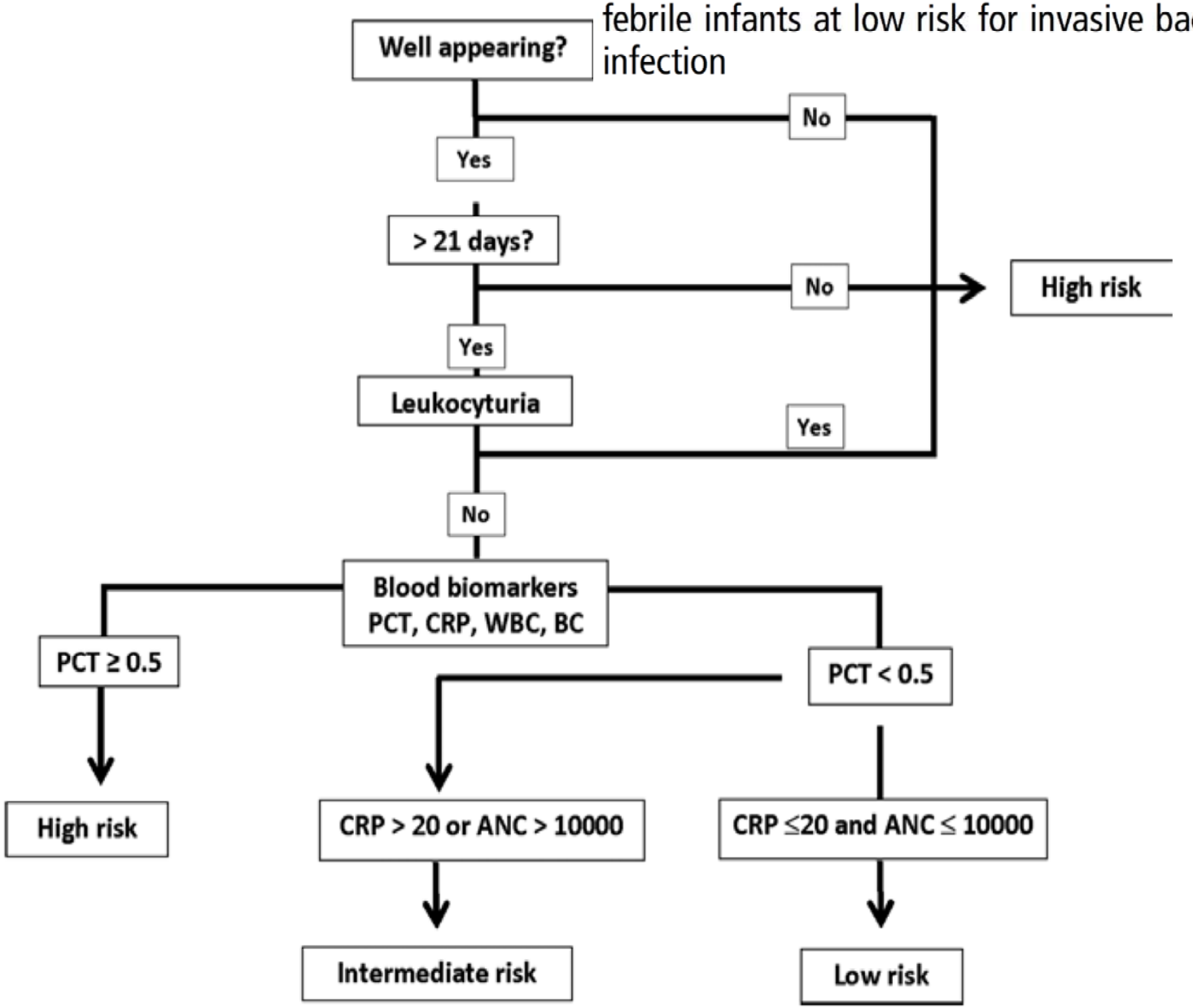


**Table 1** The observed number of serious bacterial infections and invasive bacterial infections in low-risk patients defined by three different strategies

| | Step by step, n=488 | Lab-score, n=693 | Rochester, n=458 |
|---|---|---|---|
| Invasive bacterial infections | 1; 0.2% (0%–0.5%) | 5; 0.7% (0.1%–1.3%) | 5; 1.1% (0.1%–2%) |
| Possible serious bacterial infections | 46; 9.4% (6.8%–12.1%) | 61; 8.8% (6.6%–10.9%) | 48; 10.5% (7.6%–13.2%) |
| Definite serious bacterial infections | 1; 0.2% (0%–0.5%) | 70; 10.1% (7.8%–12.3%) | 5; 1.1% (0.1%–2.0%) |

**Conclusions** A sequential approach to young febrile infants based on clinical and laboratory parameters, including procalcitonin, identifies better patients more suitable for outpatient management.

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# Seguimiento de los Algortimos

Practice Variations in the Treatment of Febrile Infants Among Pediatric Emergency Physicians

*Pediatri*

Emergency Department Laboratory Eva
Fever Without Source in Children

42/peds.2010-3855

A Survey of t
in P

(*Pediatr Emer Care* 2012;28: 1022–1026)

**Fev** **gnificant variations in how infants aged ≤60 days are** **derline the need for guidelines**

Acta Pædiatrica. Published by John Wiley & Sons Ltd 2014 **103**, pp. 379–385

**Seguimiento irregular y escaso**

# Management and Outcomes of Care of Fever in Early Infancy

*JAMA. 2004;291:1203-1212*

**Design** Prospective cohort study.

**Setting** Offices of 573 practitioners from the Pediatric Research in Office Settings (PROS) network of the American Academy of Pediatrics in 44 states, the District of Columbia, and Puerto Rico.

**Patients** Consecutive sample of 3066 infants aged 3 months or younger with temperatures of at least 38°C seen by PROS practitioners from February 28, 1995, through April 25, 1998.

**Conclusions** Pediatric clinicians in the United States use individualized clinical judgment in treating febrile infants. In this study, relying on current clinical guidelines would not have improved care but would have resulted in more hospitalizations and laboratory testing.

# Management of Fever in Postpneumococcal Vaccine Era: Comparison of Management Practices by Pediatric Emergency Medicine and General Emergency Medicine Physicians

Emergency Medicine International

Table 2: Laboratory test performed.

| | PED ($n$ = 224) | GED ($n$ = 237) | $P$ value |
|---|---|---|---|
| | Diagnostic studies | | |
| CBC (%) | 8 (4) | 9 (4) | NS |
| BCX (%) | 8 (4) | 7 (3) | NS |
| UCX (%) | 20 (9) | 11 (5) | 0.09 |
| CXR (%) | 23 (10) | 51 (22) | 0.001 |
| VIRAL testing (%) | 102 (46) | 40 (17) | <0.001 |
| | Prescriptions | | |
| Antibiotics | 61 (27) | 97 (41) | 0.002 |
| Antiviral | 15 (7) | 1 (0) | <0.001 |

Published 1 June 2014

# GUIÓN

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# Barriers to translating diagnostic research in febrilechildren to clinical practice: a systematic review

*Arch Dis Child* 2012;**97**:667–672. doi:10.1136/archdischild-2011-300667

**Table 1** Identified problems of diagnostic research in febrile children and proposed solutions

| Identified problem | Proposed solution |
|---|---|
| **Patient selection** | |
| Patient selection based on age and temperature limits | Include age or temperature as predictors |
| Selection and definition of predictors | |
| Heterogeneity of selected predictors | Use a defined set of clinical predictors |
| | Use objective clinical predictors |
| | Broad validation |
| Clinical value | Stepwise analysis of patient history and examination, with evaluation of the added value of diagnostic tests (new markers) |
| | Use rule out symptoms ('green flags') |
| Diagnostic value of 'new' predictors and 'time course' | Parental concern |
| | Diagnostic value of 'safety-netting' |

| | |
|---|---|
| **Outcomes** | |
| Lack of reference test to confirm bacterial origin | Pragmatic clinical definitions or composite reference test |
| | Include follow up time in the definition of outcome |
| The changing definition of serious infection/low prevalence of serious outcome | Consider other important out-comes such as need for referral, hospitalisation |
| | Adjust outcome definition to setting |
| | Focus on ruling out versus ruling in serious infections |
| Heterogeneous outcomes/ intermediate outcomes (severity or probability) | Polytomous modelling |
| **Generalisability to different clinical settings** | |
| Setting with differences in prior risk/ (geographic or temporal) changes in case mix | Studies in low prevalence settings (pri-mary care) are required |
| | Continuous validation studies |
| Mismatch of the diagnostic research approach to the clinical diagnostic process | Include repeated assessment of children |
| | Include reassessment plan (safety-netting) in the implementation of decision rule |
| Lack of impact of the prediction rule on patient outcome/lack of implementation of rule in routine practice | Impact analysis |
| | Implementation strategies |

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# Repeated Emergency Department Visits Among Children Admitted With Meningitis or Septicemia: A Population-Based Study

Annals of Emergency Medicine
2014

*What this study adds to our knowledge*

In this database of all Ontario ED visits during a 5-year period, 1 in 5 children with meningitis or septicemia had a previous ED visit. Children who return to the ED and receive a diagnosis of meningitis and septicemia have clinical outcomes similar to those who receive a diagnosis at the initial visit.

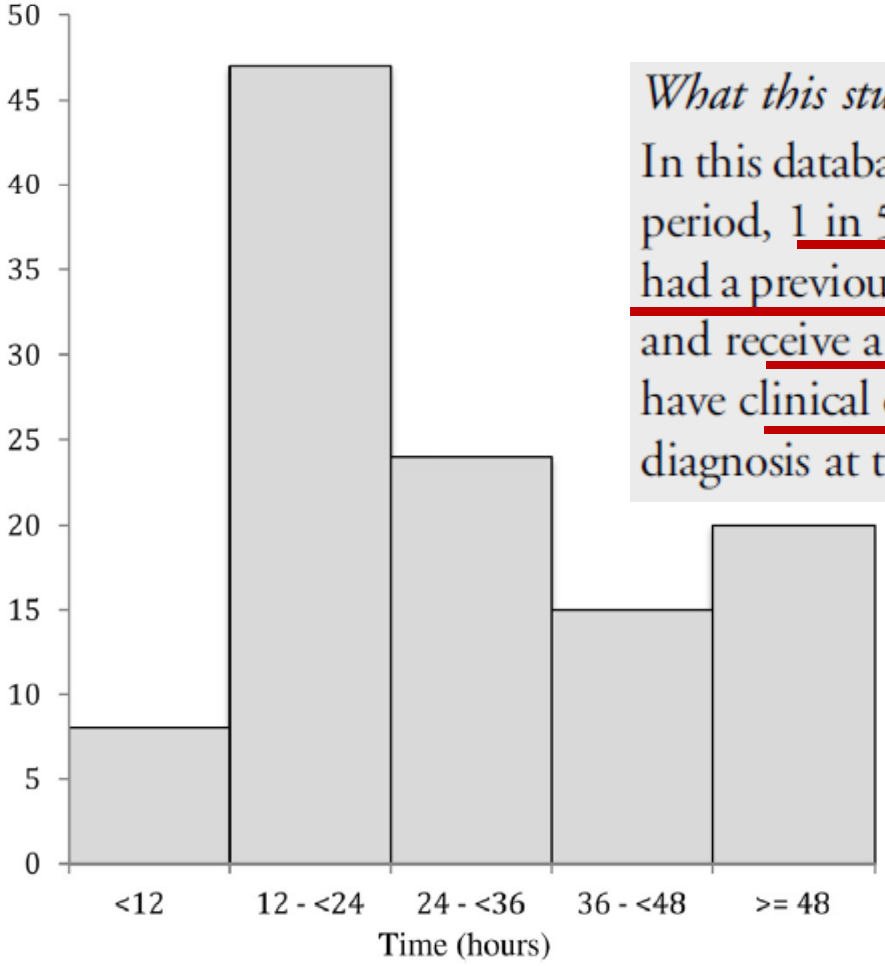



**Figure 2.** Number of patients by interval between previous related ED visit and return to ED for admission with meningitis or septicemia.

- ✓ Edad : 30 días – 5 años (2005–2010)
- ✓ Sepsis / Meningitis
- ✓ 521 pacientes incluidos
- ✓ 114 (21.9%) repiten visita
- ✓ No diferencias : estancia, UCI, mortalidad ( 2.9 % )

Annals of Emergency Medicine

# Sick Kids Look Sick

Steven M. Green, MD*; Lise E. Nigrovic, MD, MPH; Baruch S. Krauss, MD, EdM

*Corresponding Author. E-mail: steve@stevegreenmd.com.

In summary, the study by Vaillancour
that although children discharged f
diagnosis of a minor infecti
sepsis or meningitis, th orse
outcomes than if osis on their
original pr interpretation is
that s sent on the first visit and
inically manifest. In other
sick. These results encourage
icians to trust the power and value of
al gestalt.

El niño enfermo...parece enfermo (si no,no lo está)

# Y el futuro…..?

**Técnicas de detección de patógenos**

PCR para detección gen ARN ribosomal 16S de bacterias
PCR multiple para detección de múltiples organismos

Estudios en curso

**Cuantificación de la respuesta del huesped**

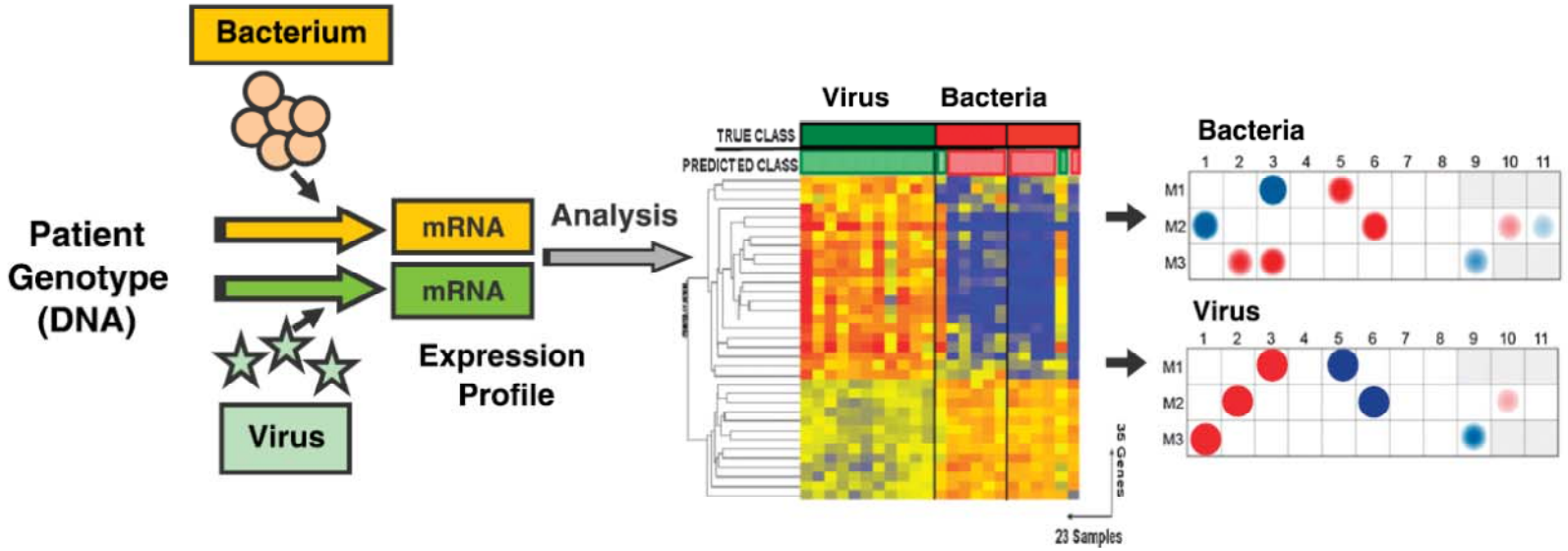
Biosignaturas transcipcionales diferentes en ARN de leucocitos medibles por microarrays (95 % precisión)

Rajan Aroa, MD, Prashant Mahajan, MD. **Evaluation of child with Fever Without Source. Review of literature and UpDate.** Pediatr Clin N Am 60 (2013) 1049-1062

# RNA Transcriptional Biosignature Analysis for Identifying Febrile Infants With Serious Bacterial Infections in the Emergency Department

## *A Feasibility Study*

*Prashant Mahajan, MD, MPH, MBA,* Nathan Kuppermann, MD, MPH,† Nicolas Suarez, PhD,‡ Asuncion Mejias, MD, PhD,‡ Charlie Casper, PhD,§ J. Michael Dean, MD, MBA,§ Octavio Ramilo, MD,‡ and the Febrile Infant Working Group for the Pediatric Emergency Care Applied Research Network (PECARN)*




*Pediatric Emergency Care* • Volume 31, Number 1, January 2015


Y ellos que prefieren ?

# COMENTARIOS


- 1. Ad… e realiza la visit…
- 2. Con… grave, panel …
- 3. Inte… …cional”
- 4. Evit… …on la edad …
- 5. Inclu… …de los padres…
- 6. Vali… interna…
- 7. No … …eal
- 8. Utilizar “ lo indicado” “cuándo está indicado” “en quién está indicado” “donde está indicado”…y suertei

Muchas gracias por su atención
Thank you very much