

Corso di Laurea in Medicina e Chirurgia

Corso Integrato di Pediatria

Approccio al bambino con febbre

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Department of Translational Medical Sciences
Section of Pediatrics



Antonio (5 years)

Giulia (7 months)

Accesso al Pronto Soccorso

Febbre (38.3°C)

12 giorni

Da quanto tempo?

3 giorni

chi ci preoccupa di più?

Antonio (5 anni)

12 giorni

Giulia (7 mesi)

3 giorni

"Fever Five"

1. Fever is defined only if body temperature $\geq 38^{\circ}\text{C}$ (low-grade 37.3°)
2. Rectal temperature is the closest to Central temperature
3. Always use a reliable tool
4. Ask for **Vaccination** or **Acetaminophen** in previous hours
5. Factitious fever

Fever is responsible for 10-20% of pediatric emergency visits

Viral infections are the main cause

Fever does not always mean severe clinical features

Febbre senza localizzazione

Febbre di durata < 8 giorni in un bambino in cui anamnesi ed esame clinico non evidenziano segni di localizzazione di una possibile causa

Febbre di origine sconosciuta

Febbre protratta > 8 giorni in un bambino in cui la storia clinica la visita e gli esami di laboratorio non evidenziano una possibile causa (2006)

Febbre ricorrente

Febbre continua per alcuni giorni intervallata da giorni di apiressia

Fever Without a Source

Febbre di durata < 8 giorni in un bambino in cui anamnesi ed esame clinico non evidenziano segni di localizzazione di una possibile causa

No storia nè evidenza di :

- Sintomi respiratori (tosse, rinite, distress respiratorio, otalgia)
- Diarrea
- Vomito
- Rash cutaneo
- Dolore localizzato

Il bambino si può presentare in condizioni cliniche buone o essere irritabile soporoso o disidratato

Fever Without a Source

Febbre di durata < 8 giorni in un bambino in cui anamnesi ed esame clinico non evidenziano segni di localizzazione di una possibile causa

- 5 – 10% of children with fever
- **Infections (i.e. UTI) are the main causes of FWS, and 3 – 6% of children has bacteraemia !!!**
- 8-12% has Severe Bacterial Infection (SBI) in children < 3 months with fever
- 1-2% Invasive Bacterial Infection (IBI) -> bacteraemia or meningitis
- Diagnostic delay in IBI is associated to elevated morbidity and mortality

Fattori che influenzano l'eziologia e la gestione del bambino con febbre

Caratteristiche dell'infezione

Stimare il rischio di infezione batterica grave/invasiva

Caratteristiche del paziente

Età, presentazione clinica, stato immunitario

Setting

Health-care facilities, compliance della famiglia, ambiente

Fattori che influenzano l'eziologia e la gestione del bambino con febbre

Caratteristiche dell'infezione

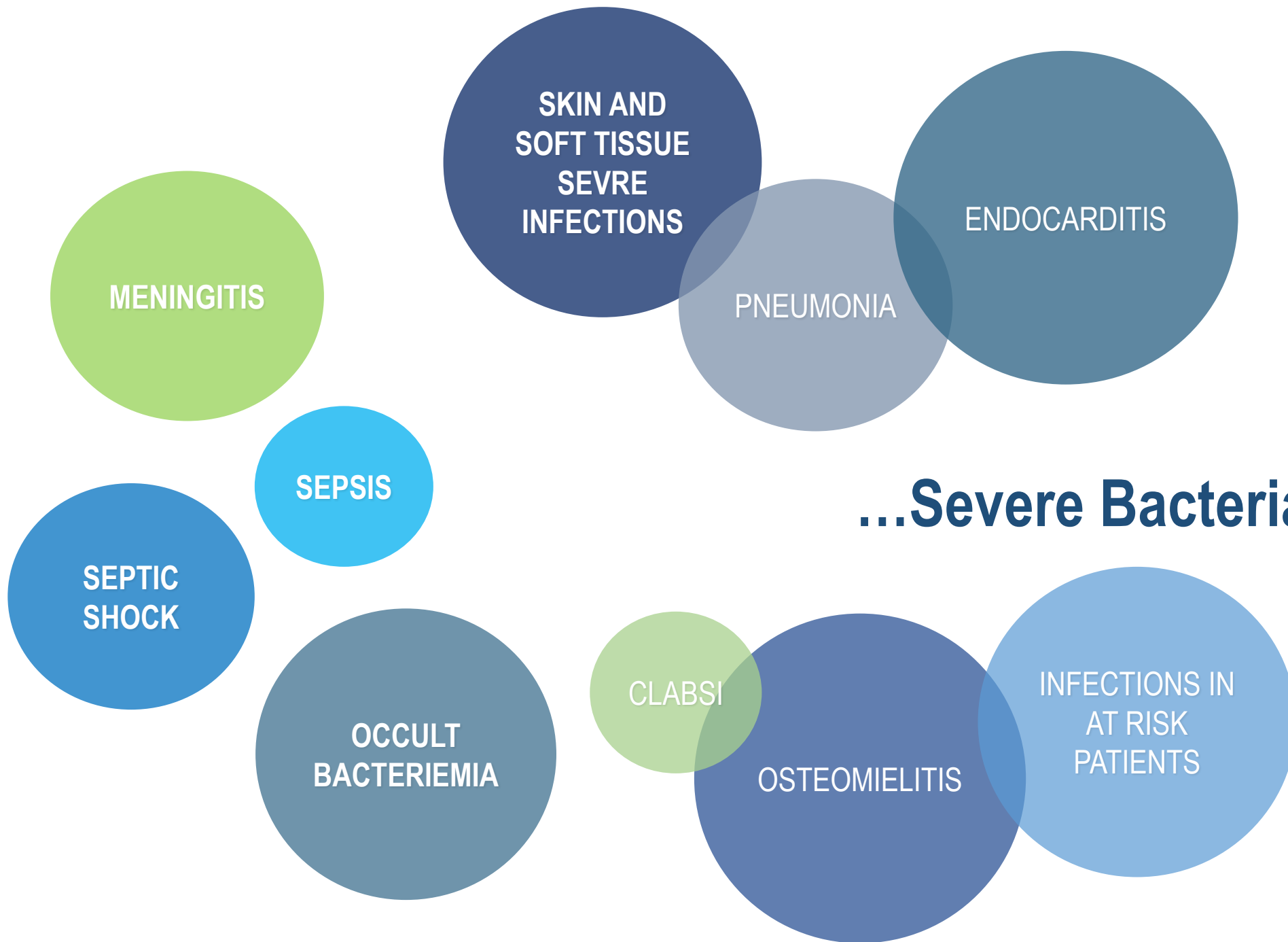
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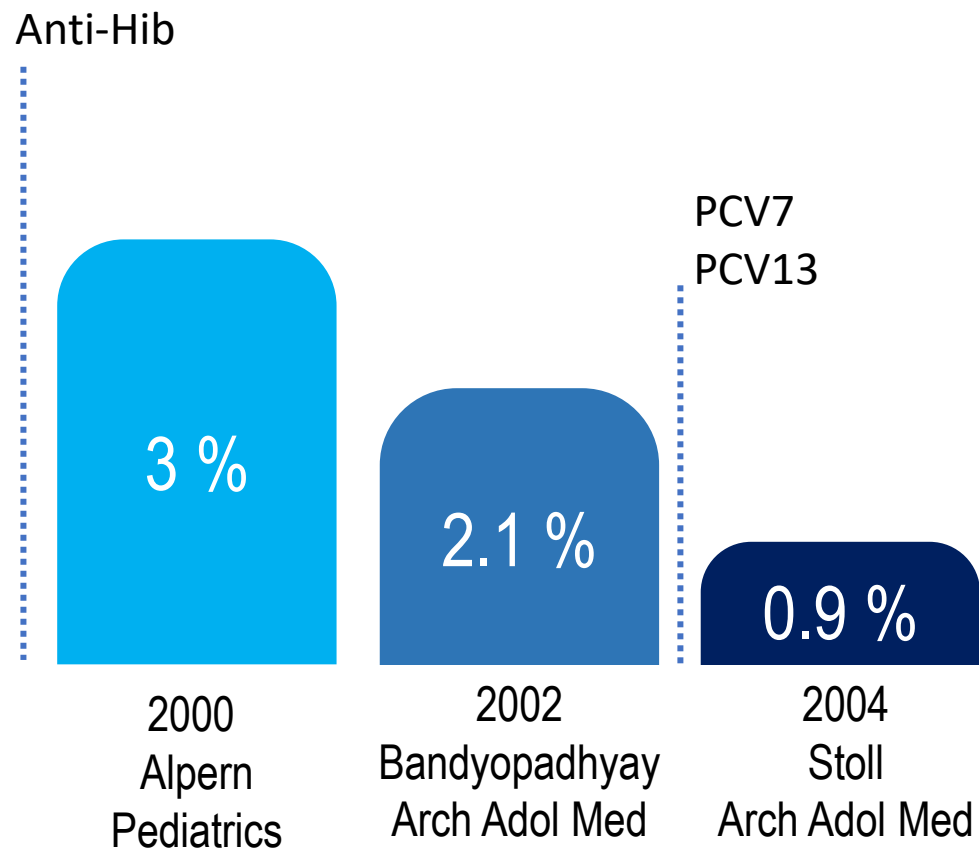
Health-care facilities, compliance della famiglia, ambiente



Think about
...Severe Bacterial Infections

OCCULT BACTEREMIA in children > 3 months with FWS

The role of Vaccination



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

BACTEREMIA in children with FWS

The risk in children with viral infection

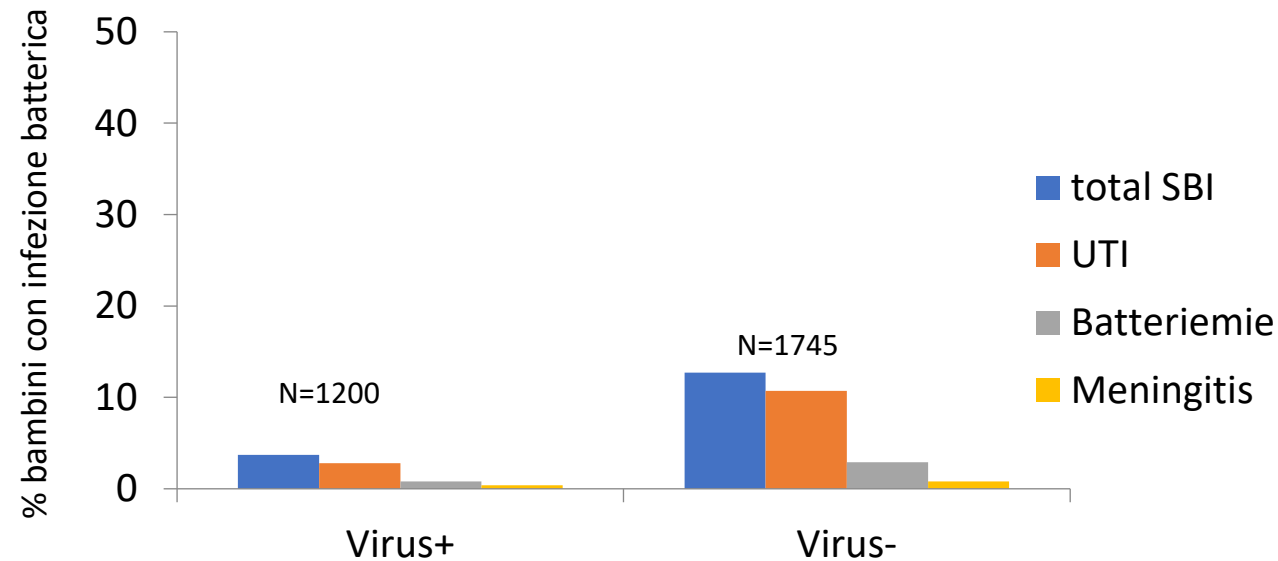
Group	n.	Positive blood culture: Contamination (%)	Positive blood culture: true positives (%)
Bronchiolitis	411	4 (1)	1 (0.2)
Croup	249	4 (1.6)	0 (0)
Stomatitis	123	2 (1.6)	0 (0)
Varicella	93	2 (2.2)	1 (1.1)
Total	876	12 (1.4)	2 (0.2)

Risk of Bacterial Coinfections in Febrile Infants 60 Days Old and Younger with Documented Viral Infections

Mahajan et al, J Pediatr 2018

2945 lattanti febbrili con screening per infezione virale

- 1200 (48.1%) virus positivi; 44 SBI, , 33 UTI, 9 batteremia
- 1745 virus-negativi ; 222 SBI, 186 UTI 186, 50 batteremia



Febrile infants ≤ 60 days of age with viral infections, are at significantly lower, but non-negligible risk for SBIs, including bacteremia and bacterial meningitis.

Fattori che influenzano l'eziologia e la gestione del bambino con febbre

Caratteristiche dell'infezione

Stimare il rischio di infezione batterica grave/invasiva

Caratteristiche del paziente

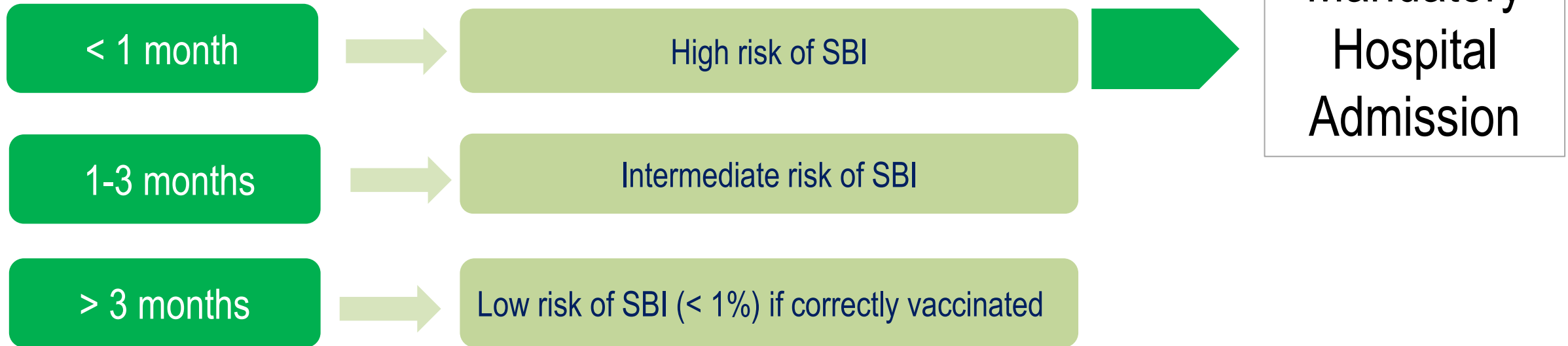
Età, presentazione clinica, stato immunitario

Setting

Health-care facilities, compliance della famiglia, ambiente

Caratteristiche del paziente

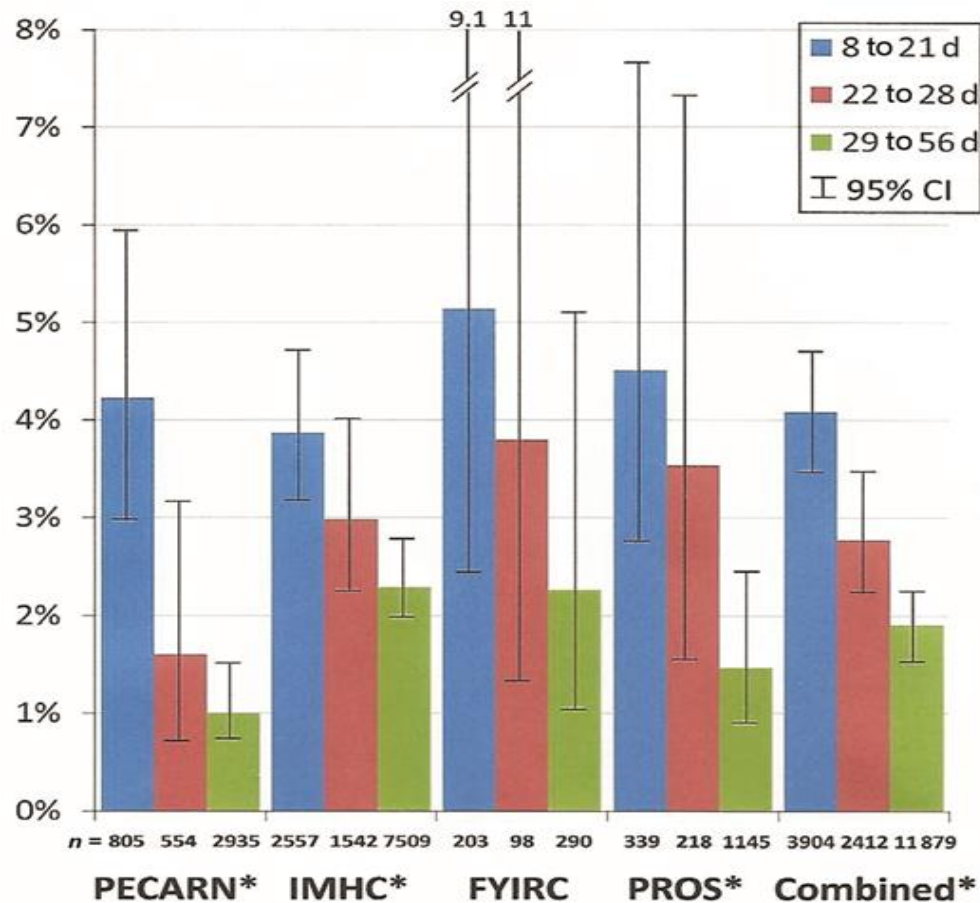
ETA'





Evaluation and Management of Well-Appearing Febrile Infants 8-60 Days Old

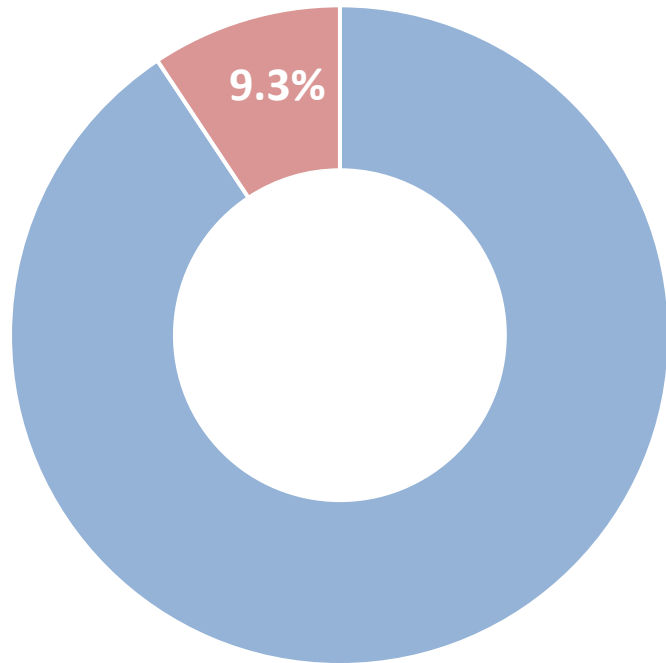
Evidence for Age-Based Risk Stratification



The committee decided that infants in the first week of life are sufficiently different in rates and types of illness, including early-onset bacterial infection, that they should be excluded from this guideline.

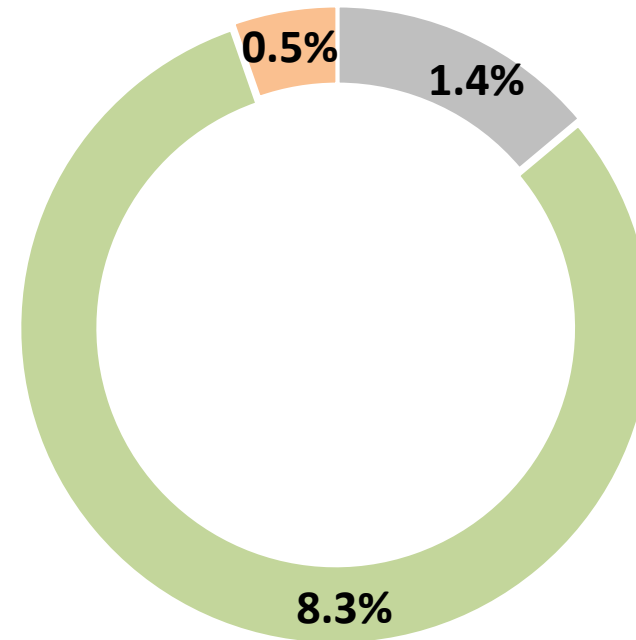
Serious Bacterial Infections in febrile infants 60 days and younger

- 1821 febrile infants
- 170 SBI



■ febrile infants ■ Serious bacterial infection

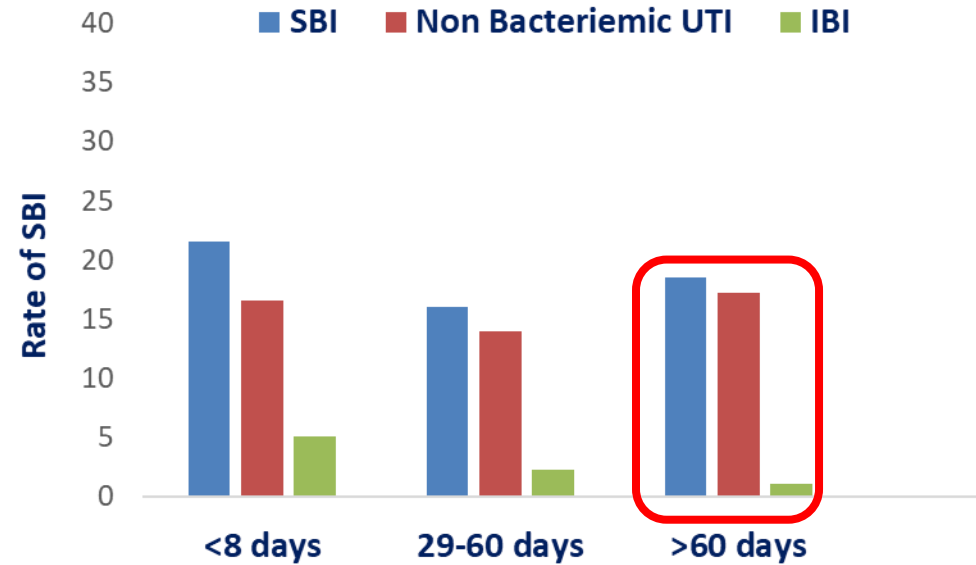
16 (0.9%) had concurrent SBIs



■ Bacteriemia
■ Urinary tract infections
■ Meningitis

Prevalence of bacterial infection in febrile infant 61–90 days old

Bonilla et al, *Pediatr Infect Dis J* 2019



IBI

	<8 days	29-60 days	>60 days
Well-appearing	35 (5.1%, 3.7–7.0)*	32 (2.3%, 1.6–3.3)*	14 (1.1%, 0.6–2.2)
Non well-appearing	30/665 (4.5%, 3.2–6.4)*	26/1,325 (2.0%, 1.3–2.9)†	12/1,211 (1%, 0.6–1.7)
	5/23 (21.7%, 9.7–42.0)	6/53 (11.3%, 5.3–22.6)	2/24 (8.3%, 2.3–25.8)

TABLE 2. Distribution of the IBIs Related to the Different Groups of Age (Reference Age Group >60 Days Old)

	<28 days (n = 688)	29–60 days (n = 1,378)	≥61 days (n = 1,235)
Sepsis	4 (0.6%, 0.2–1.5)	3 (0.2%, 0.1–0.6)	2 (0.2%, 0–0.6)
Meningitis	11 (1.6%, 0.9–2.8)*	1 (0.1%, 0–0.4)	0
Occult bacteremia	6 (0.9%, 0.4–1.9)	14 (1.0%, 0.6–1.7)	6 (0.5%, 0.2–1.1)
Bacteremia with a source of infection, mainly UTI	14 (2.0%, 1.2–3.4)*	14 (1.0%, 0.6–1.7)	6 (0.5%, 0.2–1.1)

Probability of bacterial infections in febrile infants less than three months of age: a meta-analysis

Baraff – PIDJ 1992

14 studies

1068 patients low risk + 635 high risk

Low risk

- Otherwise healthy
- «Non Septic» scenario
- No organ localisation
- Normal urine sample
- WBC 5000 – 15000/mm³
- Band cells < 1500/mm³
- Faecal leucocytes < 5 GB/field

Age (Days)	Low Risk			High Risk				
	Total	SBI	Bacteremia	Bacterial meningitis	Total	SBI	Bacteremia	Meningitis
≤91	69	2	2	0 (NR) ^c	48	10	4	0 (NR)
28-90	100	8	3	0 (NR)				
4-56	17	0	0	0 (0)	35	7	5	0 (5)
3-14	16	1	0	0 (3)	30	9	1	3 (4)
4-89	144	1	0	0 (26)	89	22	9	0 (16)
3-60	148	0	0	0 (NR)	88	16	9	1 (NR)
≤60	106	0	0	0 (NR)	197	NR	NR	NR (NR)
≤61	20	1	0	0 (1)	17	0	0	0 (1)
<56	61	2	0	0 (8)	36	5	4	4 (8)
11-59	86	1	1	0 (2)				
5-92	31	1	1	0 (NR)	2	2	2	1 (1)
8-60	31	0	0	0 (NR)	25	12	11	2 (NR)
8-42	18	NR	0	0 (NR)	43	NR	9	2 (NR)
≤91	221	5	1 ^c	0 (NR)	222	48	7	2 (NR)
	1068	22	8	0 (40/344)	635	131	61	15 (35/209)

	% Risk	SBI	Bacteraemia	Meningitis
Patients high risk		24.3	12.8	3.9
Patients low risk		2.6	1.3	0.6
Negative predictive value		95-99	99	99.5

Yale observation scale for infant fever

Interpretation

Score - 10 → 2.7% SBI

Score 11-15 → 26% SBI

Score > 16 → 92.3% SBI

Observation Item	Normal (Score = 1)	Moderate Impairment (Score = 3)	Severe Impairment (Score = 5)
1. Quality of cry	Strong with normal tone OR content and not crying	Whimpering OR sobbing	Weak OR moaning OR high pitched
2. Reaction to parent stimulation	Cries briefly then stops OR content and not crying	Cries off and on	Continual cry OR hardly responds
3. State variation	If awake → Stays awake OR if asleep and stimulated → wakes up quickly	Eyes close briefly awakes up with prolonged stimulation	Awake OR falls to sleep OR does not wake up
4. Color	Pink	Pale extremities OR acrocyanosis	Pale OR cyanotic OR mottled OR ashen
5. Hydration	Skin normal, eyes normal AND mucous membranes moist	Skin/eyes normal AND mouth slightly dry	Skin doughy/tented AND dry mucous membranes AND/OR sunken eyes
6. Response (talk, smile) to social overtures	Smiles OR alerts (≤ 2 mo)	Brief smile OR alerts briefly (≤ 2 mo)	No smile, face anxious/dull/ expressionless OR no alerting (≤ 2 mo)

	< 1 month	1 -3 months	> 3 months
Risk of SBI	+++	++	+/-
Diagnostic work-up	FBC, CRP Blood culture Urine analysis and culture Chest X Ray Stool culture CSF culture	FBC, CRP Blood culture Urine analysis and culture Chest X Ray Stool culture	FBC, CRP Blood culture Urine analysis and culture
Risk assessment	Always HIGH	YALE Scale	YALE Scale
Setting of Management	HOSPITAL (Mandatory)	HOSPITAL (Recommended) To be assessed according to: - Family compliance - YALE observation scale - Urinalysis - Clinical feature	CLINIC / AMBULATORY
Antibiotic treatment	Immediately after culture	Immediately after culture	After culture and first diagnostic assessment

Fattori che influenzano l'eziologia e la gestione del bambino con febbre

Caratteristiche dell'infezione

Stimare il rischio di infezione batterica grave/invasiva

Caratteristiche del paziente

Età, presentazione clinica, stato immunitario

Setting

Health-care facilities, compliance della famiglia, ambiente

- Age < 1 month
- Shock/Instability
- Necessity to perform tests or procedures only provided in hospital
- Persistent fever
- Recent travels in tropical or sub-tropical areas
- Family compliance/Social circumstances
- Comorbidity
- Necessity of treatment only provided in hospital

Diagnosis

Procalcitonin

Bio-Markers

Procalcitonin as a Marker of Serious Bacterial Infections in Febrile Children Younger Than 3 Years Old

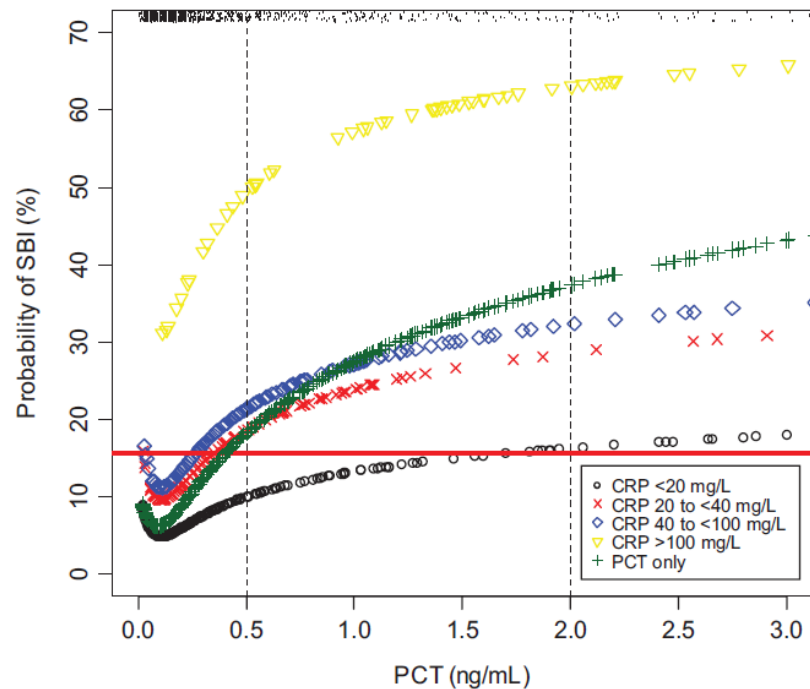
Table 1
Demographic, Clinical, and Laboratory Characteristics of Enrolled Patients (Stratified by SBI Status)*

Characteristic	All Patients, N = 226	SBI Negative, n = 196	SBI Positive, n = 30	Difference in Means or Percentages (95% CI)
Demographics				
Age (months)	10.5 (±8.4)	10.6 (±8.4)	9.6 (±8.1)	-1.0 (-2.2 to 4.3)
% < 3 months	43 (19.0)	38 (19.4)	5 (16.7)	-2.7 (-17.1 to 11.7)
Male sex (%)	95 (42.0)	88 (44.9)	7 (23.3)	-21.6 (-4.9 to -38.3)
Nonwhite race (%)	200 (88.5)	174 (88.8)	22 (86.7)	-2.1 (-15.0 to 10.8)
Presenting symptoms				
Duration of fever (days)	1.9 (±1.5)	1.8 (±1.4)	2.5 (±2.1)	-0.7 (-1.2 to -0.1)
Presenting temperature (°C)	39.3 (±0.9)	39.3 (±0.8)	39.4 (±0.9)	0.1 (-0.4 to 0.2)
Test results				
WBC count (×10 ⁹ cells/L)	12.4 (±6.3)	11.5 (±5.3)	18.6 (±8.6)	7.1 (4.8 to 9.3)
ANC (×10 ⁹ cells/L)	6.3 (±4.6)	5.6 (±3.8)	10.6 (±6.7)	5.0 (3.4 to 6.7)
Absolute band count (×10 ⁹ cells/L)	0.42 (±0.70)	0.35 (±0.60)	0.90 (±1.10)	0.55 (0.15 to 0.95)
PCT (ng/mL)	0.7 (±2.3)	0.4 (±0.8)	2.9 (±5.6)	2.5 (0.4 to 4.6)
Treatments				
Antibiotics administered in ED	134 (59.3)	106 (54.1)	28 (93.3)	39.2 (27.9 to 50.5)
Antibiotics prescribed at discharge	65 (29.0)	54 (27.8)	11 (36.7)	8.9 (-9.5 to 27.3)
ED disposition				
Admitted to hospital	55 (24.3)	36 (18.4)	19 (63.3)	44.9 (26.8 to 63.0)

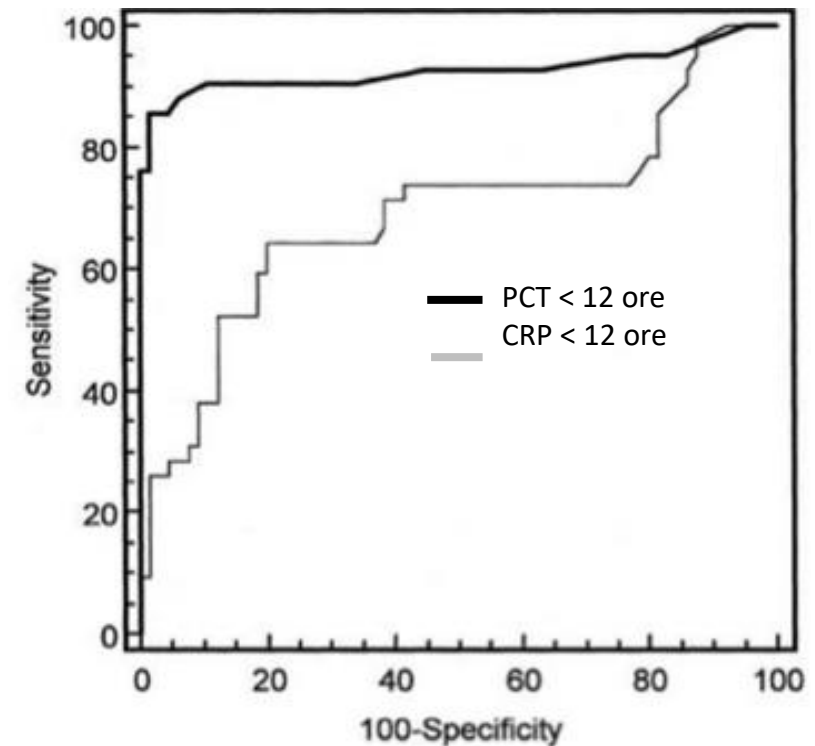
Data are reported as mean (±SD) or number (%).
ANC = absolute neutrophil count; PCT = procalcitonin; SBI = serious bacterial infection; WBC = white blood cell.

Procalcitonin is a more accurate marker of SBI in febrile siblings than WBC and neutrophiles

La PCT nell'identificazione dei bambini a rischio di SBI



La probabilità di SBI è modificata dalla PCT nei soggetti con PCR tra 20 e 100mg/L. Poco utile nei casi con PCR <20 or ≥100 mg/L



La PCT è superiore alla PCR nell'identificare bambini con SBI in uno stadio precoce della malattia

Lab score e Step-by-Step Approach nella definizione di rischio di SBI in lattanti di età ≤ 90 giorni

	Lab Score	Step-by-Step Approach
Age cutoff	N/A	≤ 21 d
Clinical appearance	N/A	Ill appearing
Laboratory	+nitrite or leukocyte esterase (1 point)	+leukocyturia
	PCT ≥ 0.5 ng/mL (2 points)	PCT ≥ 0.5 ng/mL
	PCT ≥ 2.0 ng/mL (4 points)	CRP > 20 mg/L
	CRP ≥ 40 mg/L (2 points)	ANC $> 10,000/\mu\text{L}$
	CRP ≥ 100 mg/L (4 points)	
Low risk	Score < 3 points	None of the above present

Condizioni cliniche, età, esame urine e marcatori biochimici (PCT)
 Identifica meglio i lattanti a basso rischio di SBI da gestire come outpatients

Diagnosis

Microbiology

FILMARRAY® BCID

The FILMARRAY® Blood Culture Identification (BCID) Panel tests for 24 pathogens and 3 antibiotic resistance genes associated with bloodstream infections. Identify pathogens in 9 out of 10 positive blood cultures in about an hour with only 2 minutes of hands-on time and 200µl of blood.

Gram+ Bacteria



Enterococcus
Listeria monocytogenes
Staphylococcus
Staphylococcus aureus
Streptococcus
Streptococcus agalactiae
Streptococcus pyogenes
Streptococcus pneumoniae

Gram- Bacteria



Acinetobacter baumannii
Haemophilus influenzae
Neisseria meningitidis
Pseudomonas aeruginosa
Enterobacteriaceae
Enterobacter cloacae complex
Escherichia coli
Klebsiella oxytoca
Klebsiella pneumoniae
Proteus
Serratia marcescens

Yeast



Candida albicans
Candida glabrata
Candida krusei
Candida parapsilosis
Candida tropicalis

Antibiotic Resistance



mecA - methicillin resistance
vanA/B - vancomycin resistance
KPC - carbapenem resistance



Giulia

Febbre da 3 giorni, T max °C 39.2, poco responsive al paracetamolo.

Pianto flebile, rifiuto dell'alimentazione. FC 155 bpm durante il pianto, PA 75/45 mmHg

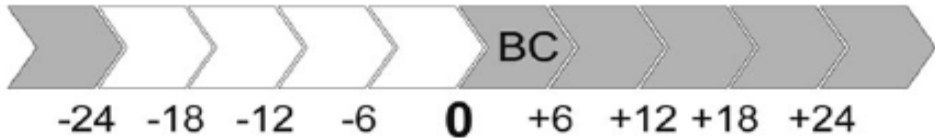
All'esame clinico: lieve disidratazione

Yale observation scale for infant fever

14

Observation Item	Normal (Score = 1)	Moderate Impairment (Score = 3)	Severe Impairment (Score = 5)
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6. Response (talk, smile) to social overtures	Smiles OR alerts (≤ 2 mo)	Brief smile OR alerts briefly (≤ 2 mo)	No smile, face anxious/dull/ expressionless OR no alerting (≤ 2 mo)

POOR FEEDING - REFUSE FOODS



HRC - high-risk
HRC - low-risk

feeding intolerance

hypotonia

I:T ratio > 0.2

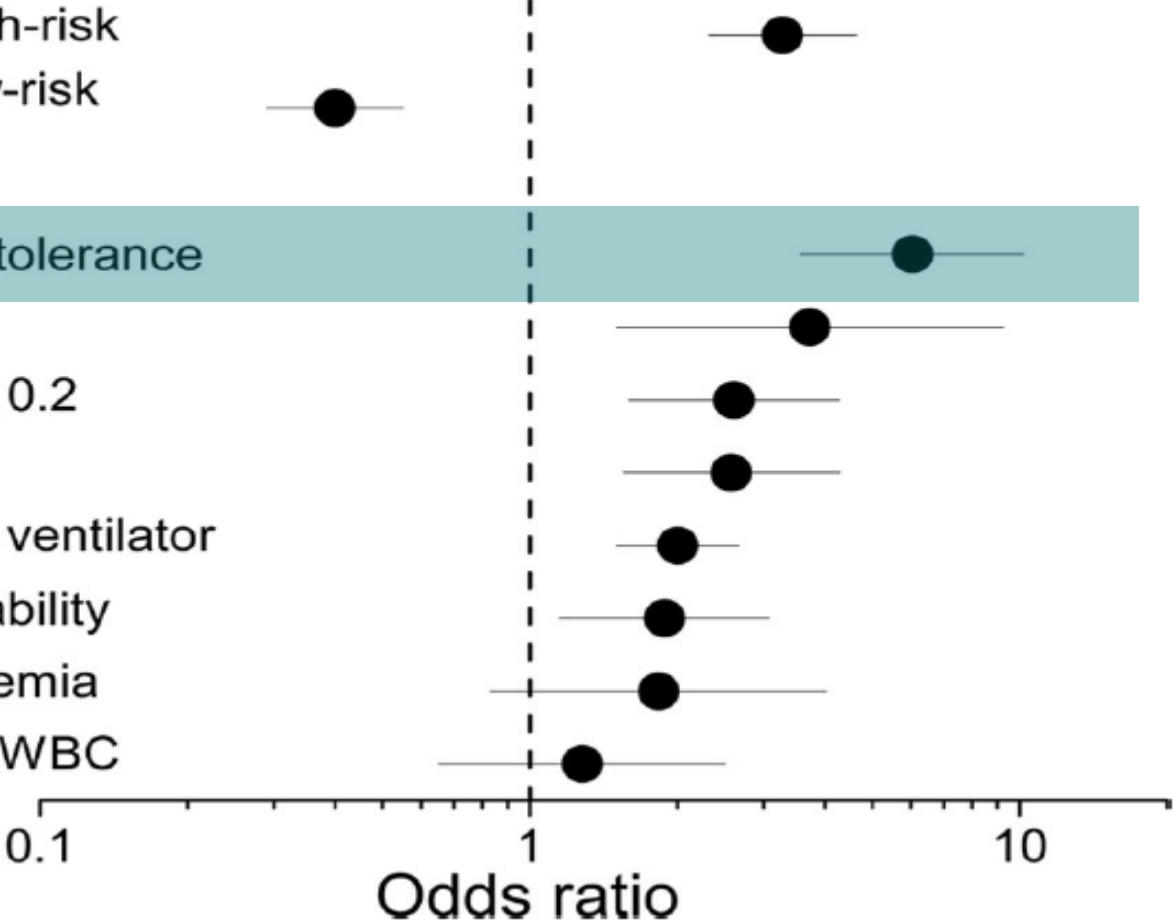
apnea

increased ventilator

temp instability

hyperglycemia

abnormal WBC



39,2% of infants with sepsis
REFUSE TO EAT

(Mahallei - Medicine 2018)

Giulia

Intermediate risk
Yale scale 10-16

Ceftriaxone 1 dose

Clinical check within 24-48 hours

HOSPITAL ADMISSION

Blood tests and Send cultures

Ceftriaxone 1 dose

36 hours later..

Persisting high fever (T Max 39°C) with shivering, Inappetence
HR 150 bpm, Capillary refill > 3 seconds

Giulia

HPC: Fever for 3 days, T max °C 39.2, barely responsive to acetaminophen.

Weak cry. Refuses food.

Examination: mild degree of dehydration, HR 130 bpm, PA 85/50 mmHg

FBC: WBC 19.000/ μ l; N 12.700/ μ l; L 3.200/ μ l; M 2.300/ μ l, Hb 12.0 g/dl; PLT 275000/ μ l;

CRP: 80 mg/L

Urine Culture: ongoing

Urine Sample: proteins positive; leukocyte esterase mild positive; nitrites absent

SEPSIS: DEFINITIONS

▶ Systemic pro-inflammatory response to an infection (getting over homeostasis)

SIRS
Systemic
Inflammatory
Response
Syndrome

Suspected infection + ≥ 2 of following criteria:

- Pathological body temperature ($<36^{\circ}\text{C}$ or $>38.5^{\circ}\text{C}$)
- Pathological heart rate (>2 DS over normal for age or <10 th centile for age in toddlers)
- High respiratory rate (>2 DS over normal for age or mechanical ventilation for acute distress)
- Pathological leukocyte count (over or under limits for age, or $>10\%$ immature neutrophils - Band cells)

FR 45 apm

FC 160 bpm

SEPSIS: DEFINITIONS

▶ Systemic pro-inflammatory response to an infection (getting over homeostasis)

SIRS
Systemic
Inflammatory
Response
Syndrome

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- High respiratory rate (>2 DS over normal for age or mechanical ventilation for acute distress)
- Pathological leukocyte count (over or under limits for age, or $>10\%$ immature neutrophils - Band cells)

SEPSIS

SIRS plus **altered consciousness and capillary refill** + demonstration of infection

FR 45 apm

FC 185 bpm

pGCS > 9

Refill > 2 sec

Urine stick (2):
Leukocyte esterase +
Nitrites ++
Ketons ++

WHAT CAUSES SEPSIS?

The most frequently identified pathogens that cause infections that can develop into sepsis include *Staphylococcus aureus* (staph), *Escherichia coli* (E. coli), and some types of *Streptococcus* (strep).

Four types of infections that are often linked with sepsis:



Lungs
(e.g., pneumonia)



Urinary tract
(e.g., kidney)



Skin



Gut

30-35% cases

Start antibiotic treatment with
CEFTRIAXONE 80-100 mg/Kg/day

Antonio (5 anni)

Anamnesi familiar: non contributiva

Anamnesi patologica remota : nato a 40 settimane da taglio cesareo. Peso alla nascita 3.250 kg.

Nessun problema durante la gravidanza allattamento materno per 2 mesi

Svezzamento a 7 mesi senza problemi, sviluppo psicomotorio nella norma vaccinato secondo calendario.

Sintomi: febbre da 12giorni con puntate febbrili 1 volta /die, T max 38.4 °C, poco responsive al paracetamolo.

No altri sintomi riferiti dalla famiglia.

Esame clinico: negativo

Blood test:

- emocromo, test di funzione epatica e renale , esame urine: ok
- PCR: 7.8 (n.v. < 5 mg/dl)
- VES: 56 mm/h



**Osservazione a domicilio e antipiretici se
necessario**

Ancora febbre!

Approfondimento diagnostico:

- Rx torace: negativo
- Eco addome: negativo
- ECG ed ecocardio: negativo

...A che pensiamo?

Fever of Unknown Origin (FUO)

What is FUO ?

Illness of more than three weeks' duration, higher than 38.3 ° C, whose diagnosis is uncertain after one week of study in hospital. (1961)

Two or more weeks of rectal temperature higher than 38.5 ° C measured in 4 occasions. (1975)

Prolonged fever of unknown origin is defined as a febrile illness for which the cause could not be elucidated during at least 3 weeks of outpatient evaluation, or for longer than one week of studies in a hospital. (1977)

Febbre protratta > 8 giorni in un bambino in cui la storia clinica la visita e gli esami di laboratorio non evidenziano una possibile causa (2006)

NON è una FUO

Febbre senza localizzazione

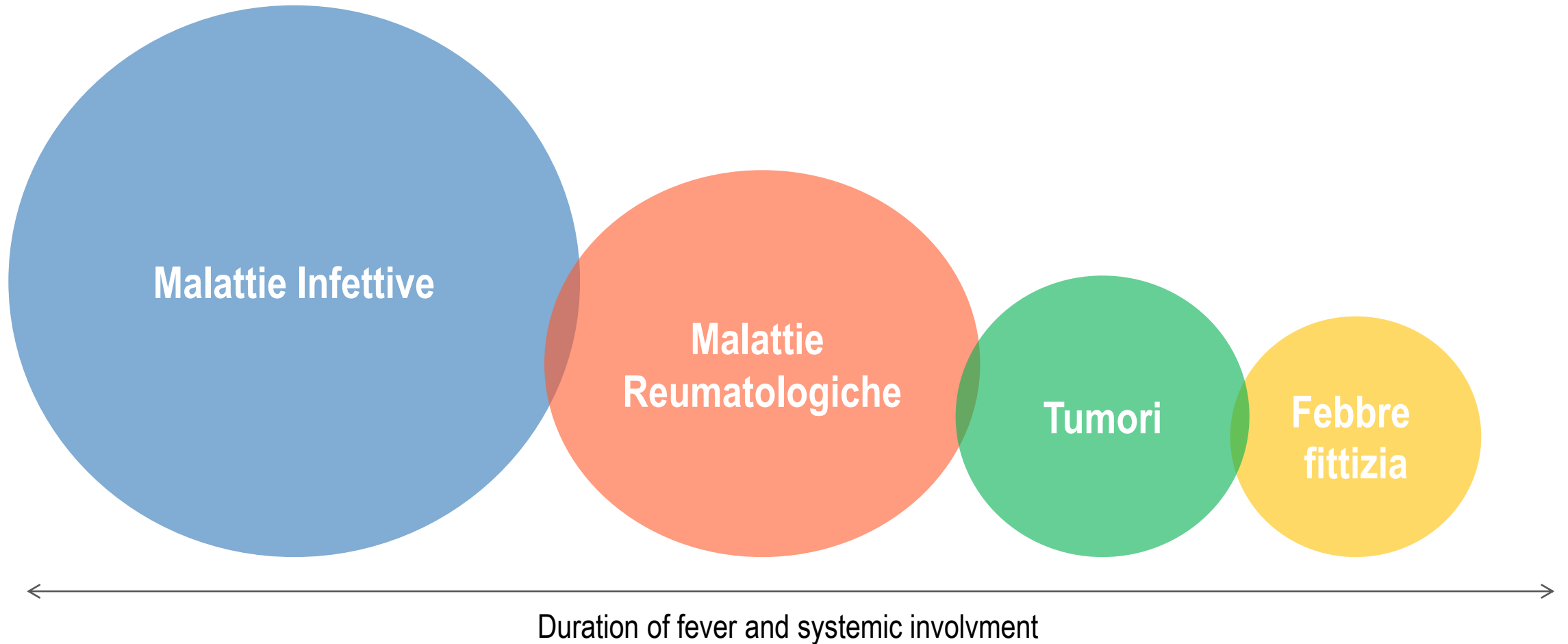
Febbre di durata < 8 giorni in un bambino in cui anamnesi ed esame clinico non evidenziano segni di localizzazione di una possibile causa

Febbre ricorrente

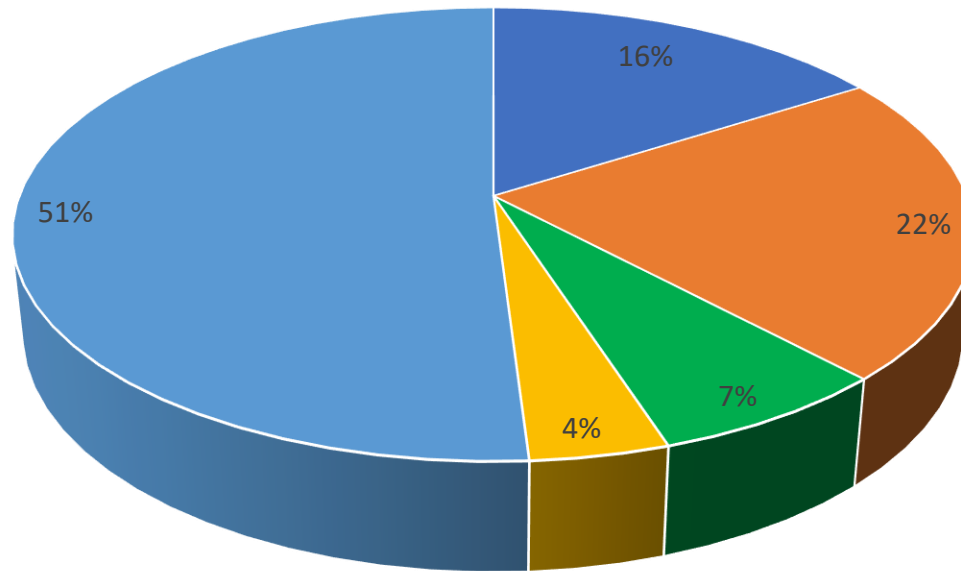
Febbre continua per alcuni giorni intervallata da giorni di apiressia

FUO: a cosa dobbiamo pensare?

FUO è generalmente la presentazione atipica di una malattia comune



FUO: cause nell' adulto



■ Infections

■ Tumors

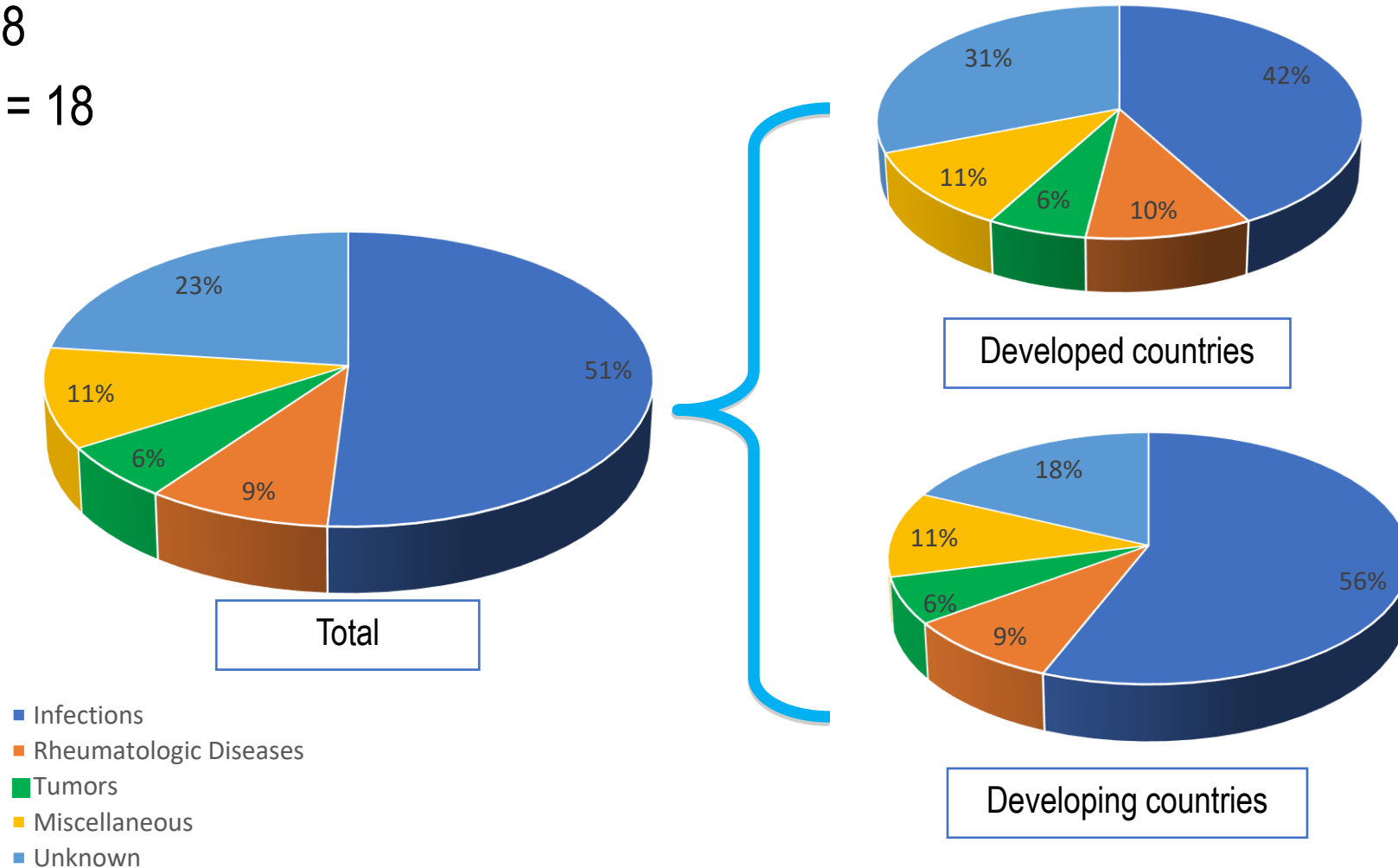
■ Unknown

■ Rheumatologic Diseases

■ Miscellaneous

FUO: cause nel bambino

- FUO > 1 wk. after first visit – age 1 month to 18 years
- N = 1638
- Studies = 18



FUO: prevalenza delle cause in base all'età

Age < 6 years

- **Infections (65%)**
- Autoimmune diseases (8%)
- Tumours (8%)
- Miscellaneous (13%)
- Unknown (6%)

Age 6-14 years

- **Infections (38%)**
- **Autoimmune diseases (23%)**
- Tumours (4%)
- Miscellaneous (17%)
- Unknown (19%)

Age > 14 years

- **Infections (36%)**
- Autoimmune Diseases (13%)
- **Tumours (19%)**
- Miscellaneous (25%)
- Unknown (7%)

Valutazione di un bambino con FUO

Raccolta anamnesi ed esame clinico accurati e ripetuti

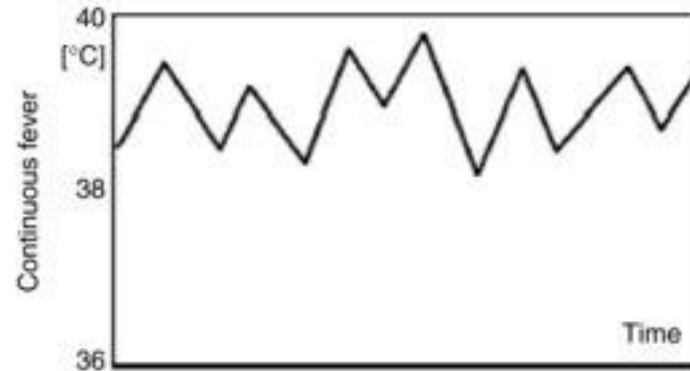


Alta percentuale di ipotesi corrette

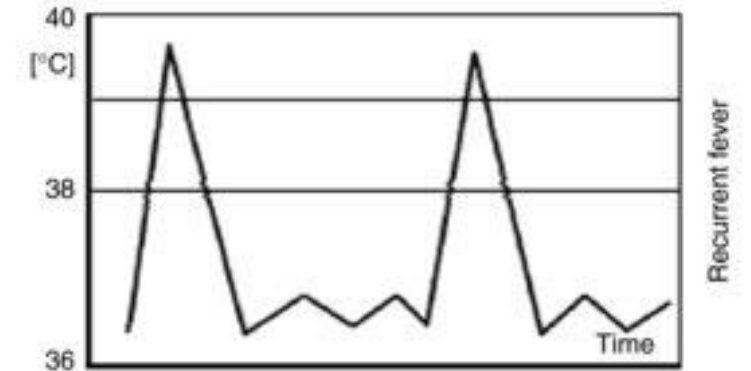
Storia clinica

- Durata e tipo di febbre
- Da quanto tempo
- Sintomi associati:
 - Dolori muscoloscheletrici
 - Lesioni di cute e mucose
 - Segni oculari
 - Sintomi GI o respiratori

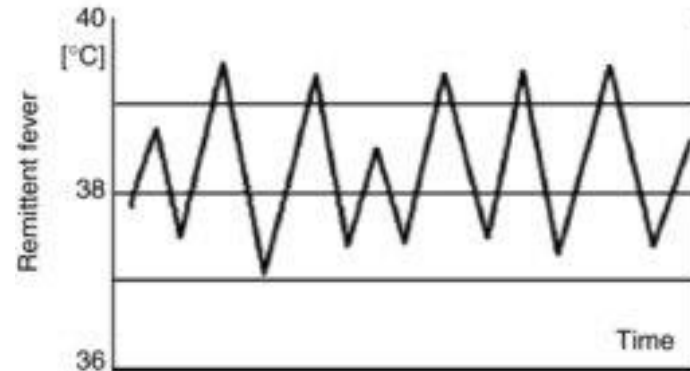
Patterns of clinical fevers



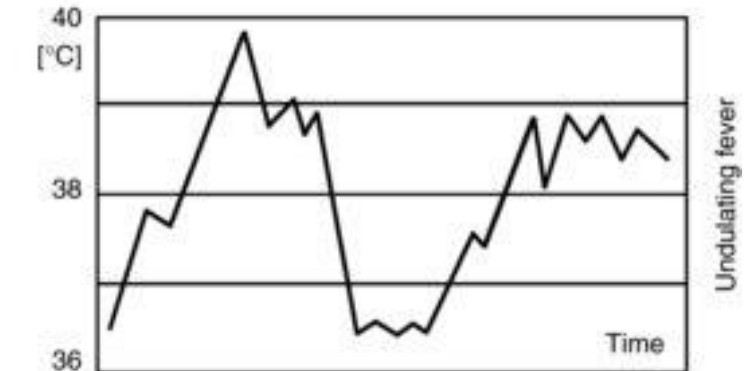
Typhus, viral pneumonia



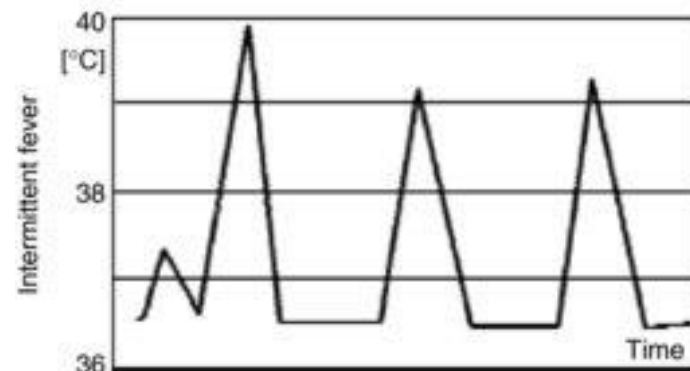
Malaria, borreliosis, cholecystitis



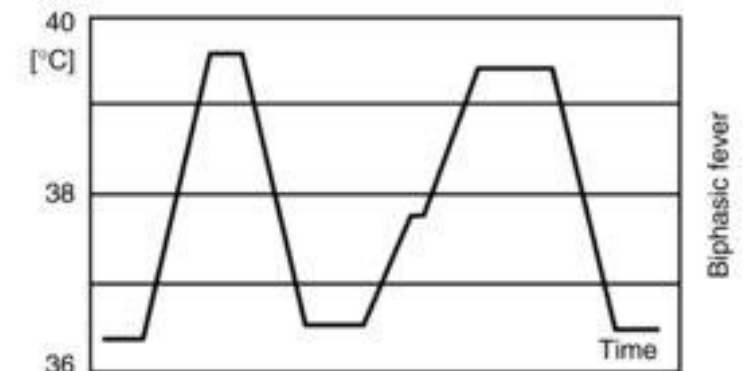
Typhus, sepsis, tuberculosis, rheumatic fever



Brucellosis, tumors (Hodgkin's disease)



Sepsis, pleuritis

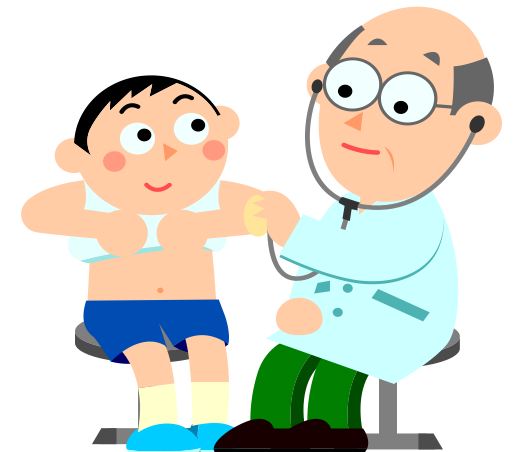


Some viral diseases

Esame clinico

- Dati auxologici
- Parametri vitali
- Esame generale (disidratazione epato-splenomegalia, linfadenomegalia, valtazione cardiaca e dei polsi periferici)
- Esame della cute (colorito, presenza di ecchimosi, ferrite, petecchie, desquamazione mani e piedi, rash, ulcere genitali o del cavo orale)
- Esame oculare(lacrimazione, Eye examination (lacrimation, rossore, proptosi)
- Esame articolare
- Esame muscolare
- Esame neurologico

Spogliare e pesare



Potentially Diagnostic Clues (PDCs)

- PDCs: presenti nel 100% dei soggetti adulti con FUO
- Se valutati singolarmente possono trarre in inganno nell'80% dei casi
- I più comuni sono:
 - Anamnesi positive per una patologia pregressa
 - **Perdita di peso**, pregressa chirurgia, cefalea, mialgie, diarrea, vertigini, dolore articolare, **soffi cardiaci**, dolore addominale e anomaly all'esame clinico del torace
 - Aumento LDH, anemia, leucocitosi, trombocitopenia/trombocitosi, alterazioni dell'esame urine, RX torace patologico



Red Flags

- Manifestazioni muco-cutanee
- Segni di coinvolgimento d'organo (cuore, polmone, fegato, reni SNC, occhi)
- Anaemia (+/- trombocitopenia/trombocitosi)

FUO: Work-up Diagnostico

I LIVELLO

Liver function	Stool Culture
Kidney function	Pharyngeal Swab
FBC	Mantoux
ESR, CRP	
Albumin, total Ig	
Blood smear	
Blood Culture	
Urine Culture	

Chest X Ray	Abdominal US
Cranium X Ray (for paranasal sinuses)	Echocardiogram
	EKG
	EEG

II LIVELLO

INFECT

Vidal-Wright	Chlamydia
Leishmania	Mycoplasma
Borrelia	EBV, CMV, Parvo
Bartonella	B19, HIV
Toxoplasma	Parasitological
Leptospira	Thick drop film
Tularemia	Gastric Aspirate
Rickettsia	CSF Culture
Coxiella	

ONCO-HEMAT

LDH, ferritin	Brain CT
Bone marrow aspiration	Ga/Tc Scintigraphy
Uric acid	FNAB
Chest/abdominal CT	(Lymphonodes?)

RHEUM

ANA	Faecal Calprotectin
C3, C4, ICs	Ophthalmologist
SMA, LKM	Scinti-CT
ANCA, ASCA	LAC, APLA, ACA
Rheumatoid fact	

III LIVELLO

Endoscopy (GI-RS)	18 FDG
FNAB (Skin, Lymphonodes)	CT-PET
	NPI
18 FDG PET	



Ordering a large number of diagnostics tests in every child with FUO according to a predetermined list may waste time and money

Prolonged hospitalization for sequential tests may be more costly

The time of diagnostic evaluation should be adjusted to the time of illness

Outpatient management

- Approccio individuale
- Anamnesi accurate e ripetute
- Escludere febbre fittizia
- Ricercare i potentially diagnostic clues
- Gestire l'ansia familiar

First level exams (after 1 week of observation)

- Emocromo con formula leucocitaria
- VES e PCR
- Esame urine ed urinocoltura
- Test di funzione epatoca e renale
- Tampone faringeo
- Rx torace
- EBV, CMV Vidal Wright (sierologia)

Quando è indicato il ricovero

- Età < 3 mesi
- Necessità di osservazione (febbre fittizia)
- Peggioramento delle condizioni cliniche
- Parametri vitali instabili
- Compliance familiar bassa
- Necessità di esami che si possono effettuare solo in ospedale
- Necessità di terapie per via endovenosa

Antonio (5 years)

Domicilio

PCR 7.8 (n.v. < 5), VES 58 mm

Emocromo: GB 4.500, N 35%, L 50%, M 12%, B 3%

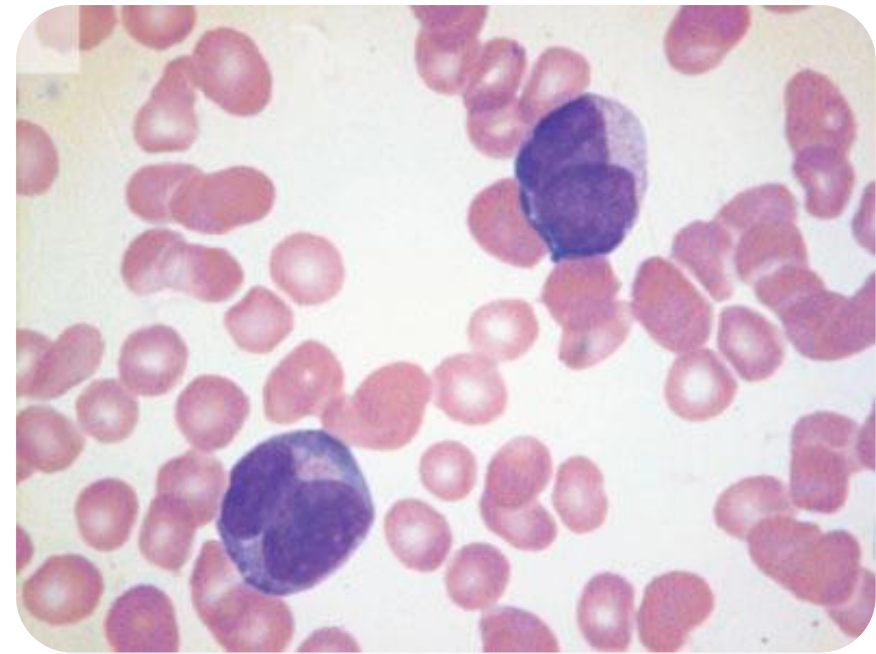
Ospedale

PCR 25 (n.v.< 5), VES 70 mm

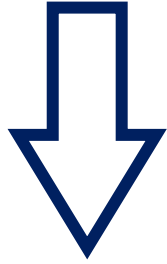
Emocromo : GB 3600, N 25%, L 55%, M 15%, B 4%

Blood Smear:

Acute Promyelocit Leukemia:



FUO

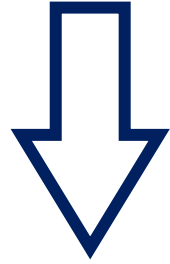


Può essere un segno
di una malattia severa

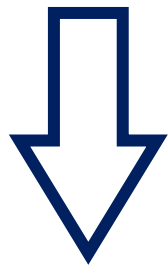


Diagnosi !!

FUO

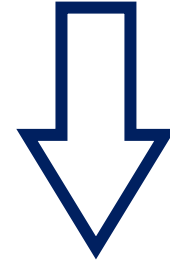


Malattia severa

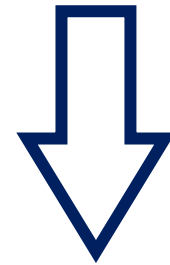


Diagnosi !!

FSL



Urgenza



Trattamento !!

Take home messages

- ✓ La maggior parte degli episodi febbrili nel bambino in buone condizioni sottende un' infezione autolimitante
- ✓ L'esame clinic è fondamentale per escludere o sospettare un'infezione severa.
- ✓ **FSL** è una **condizione urgente ed acuta** e deve essere rapidamente trattate .
- ✓ **FUO non è una condizione acuta e** deve essere accuratamente studiata .
- ✓ L'Età ha un ruolo prognostico importante (mainly < 3 months ---> HOSPITAL)
- ✓ Valuta il rischio di una SBI o IBI utilizzando un approccio a STEP .