

An Approach to the Child with Recurrent Respiratory Tract Infections



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An Approach to the Child with RRTI's

Synopsis

Introduction

Defining RRTI

Etiological approach

Crèche syndrome

Conclude



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Introduction

RRTI's: Frustrating parents

- A common problem.
- Cough, phlegm & fever causes concern.
- Socio-economic status defines severity rather than frequency of ARI's.
- Preventative measures not appealing.
- No instant cures.
- Doctors often perceived as inefficient.



Introduction

RRTI's: Frustrating doctors



- 33% of all Paediatrician visits:
 - Time consuming & demanding.
 - Close attention to history & clinical examination.
 - Possible extensive investigations.
- Lack of evidence & guidelines.
- Wide differential diagnosis.
- Most patients actually "normal" but you should not miss a sinister diagnosis.

When to investigate? & When to stop?

Couriel J. British Medical Bulletin 2002;61: 115-132

Introduction

RRTI's: Frustrating doctors



More than a scientific challenge!

- Parents & doctors have a different understanding of symptoms.
- High level of myth to challenge.
- High demand for antibiotics & ineffective medications.
- No proper ICD 10 coding.
- Pressure towards defensive medicine.

An Approach to the Child with RRTI's

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Crèche syndrome

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Defining RRTI's

No consensus on defining RRTI's

- Viral colds: ≥ 15 p.a.
- Tonsillitis: ≥ 7 in one year • ≥ 5 p.a. in 2 consecutive years
Or ≥ 3 p.a. in 3 consecutive years.
- OM: ≥ 3 in 6 months • ≥ 4 in 12 months.
- Acute sinusitis: Recurrent or ≥ 2 p.a. requiring IVI antibiotics.
- Croup: Recurrent severe episodes of croup.
- Pneumonia: Hospital admission ≥ 2 p.a. • ≥ 3 in total.
Or ≥ 2 episodes of radiologic shadowing.
- Chronic symptoms: Need for antibiotics ≥ 60 days p.a.
Or chronic colored sputum & mucus.
Or cough > 4 weeks (ACCP) / 8 weeks (BTS).

Bush A. Recurrent Respiratory Infections. Pediatr Clin N Am 2009;56:67-99

Defining RRTI's

In practice

- RTI's too great in number.
- RTI's that are too severe.
- RTI's that last too long.
- RTI's fail to resolve with standard therapy.
- RTI's associated with complications.



A matter of good clinical judgment!



Stiehm et al, Approach to the child with recurrent infections, www.uptodate.com, Sep 2012

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Take parental concern into account!



Stiehm et al, Approach to the child with recurrent infections, www.uptodate.com, Sep 2012

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Etiological approach

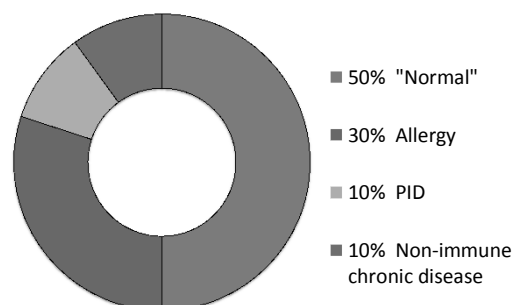
Three main reasons to RRTI's

- ① "Normal" child with recurrent ARI's.
- ② Immune dysregulation:
 - "Over active" – classic allergy.
 - "Under active" – Immunodeficiency.
- ③ Non-immune chronic problem.

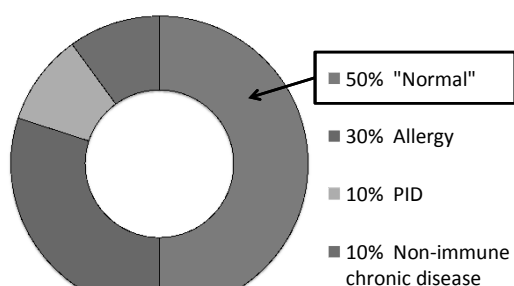


Etiological approach**Goals of an etiological approach**

- ① To identify the "normal" child, with just more than the usual number of infections, avoid unneeded investigations & treatment, & to pacify the mother.
- ② To identify & treat the allergic child correctly.
- ③ Not to miss the child with a more sinister underlying problem, to prevent unneeded suffering & irreversible complications.

**Etiological approach****Main reasons to RRTI's**

Stiehm et al, Approach to the child with recurrent infections, www.uptodate.com, Sep 2012
Christensen et al: Inborn immune deficiency, 2008.

Etiological approach**"Normal" child with RRTI's**

Stiehm et al, Approach to the child with recurrent infections, www.uptodate.com, Sep 2012
Christensen et al: Inborn immune deficiency, 2008.

Etiological approach**"Normal" child with RRTI's**

- Expect recurring ARI's (especially URTI's) in children:
 - 3-6 p.a. (Simoes E et al. World Bank, 2006)
 - 6-10 p.a. (Woroniciecka et al. Pediatr Clin North Am 2000;47:1211-24)
 - Up to 15 viral colds p.a. (Bush A. Pediatr Clin N Am 2009;56:67-100)
- Mostly mild, self-limiting & caused by viruses.
- Increase 2-8 fold with early larger group exposure.
- Symptom duration 8 days (mean) to 14 days per infection & 10% will still cough at d25.



A normal child with 10 ARI's p.a. can be symptomatic for 8 month of the year!

Stiehm et al, Approach to the child with recurrent infections, www.uptodate.com, Sep 2012

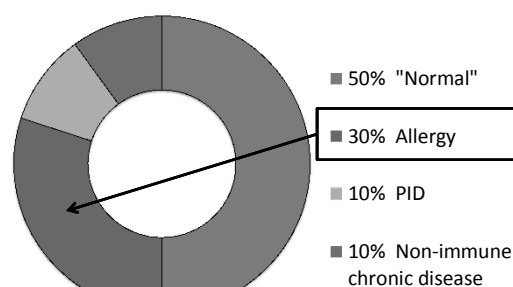
Etiological approach**"Normal" child with RRTI's**

- Support for a "normal" child with recurring ARTI's:
 - Expected duration to recovery.
 - Complete recovery between episodes.
 - Normal physical examination with no clinical features of underlying other chronic illness.
 - Normal growth & development.
 - No other system involvement.
 - ? Munchausen syndrome by proxy.



Context is crucial!

Stiehm et al, Approach to the child with recurrent infections, www.uptodate.com, Sep 2012

Etiological approach**The allergic child with RRTI's**

Stiehm et al, Approach to the child with recurrent infections, www.uptodate.com, Sep 2012
Christensen et al: Inborn immune deficiency, 2008.

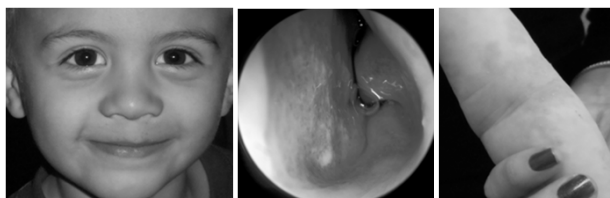
Etiological approach**The allergic child with RRTI's**

- Allergic rhinitis & comorbidities can be misdiagnosed as viral infection.
- Asthma can be misdiagnosed as LTRI's.
- Allergic children suffer increased susceptibility to infection:
 - Enhanced adherence of pathogens to inflamed epithelium.
 - Increased mucosal permeability.
 - Altered immune response to pathogens.

Stiehm et al, Approach to the child with recurrent infections, www.uptodate.com, Sep 2012

Etiological approach**The allergic child with RRTI's**

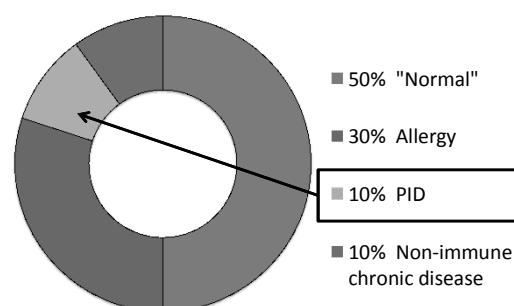
- Specifically evaluate for features of allergy:
 - History.
 - Clinical features of allergic disease like atopic eczema, shiners, Dennie lines, allergic maneuvers etc.
 - Wheeze with reversibility.
- Understanding allergy testing.

**Etiological approach****Blurring the edges between allergy & PID**

- Co-existing allergy in 31% of PID children.
- PID & allergy:
 - IgA deficiency.
 - CVID.
 - CGD.
 - DiGeorge.
- Elevated IgE in:
 - Hyper IgE syndrome.
 - WAS.
 - Omenn.
 - IPEX.



MacGinnitie A et al. *Pediatr Allergy Immunol* 2011; 22:671

Etiological approach**The PID child with RRTI's**

Stiehm et al, Approach to the child with recurrent infections, www.uptodate.com, Sep 2012
Christensen et al: *Inborn immune deficiency*, 2008.

Etiological approach**The child with an immunodeficiency**

- Secondary immunodeficiency:
 - HIV.
 - Diabetes mellitus.
 - Malignancy.
 - Immunosuppressive medication.
 - Protein losing conditions.

**Etiological approach****The child with PID**

- PID most frequently presents with RRTI's.
- Not rare:
 - Incidence vary from 1:300.
 - Prevalence of 1:2,000 in population based USA study. (Boyle et al. *J Clin Immunol* 2007; 27:497)
- PID pictures:
 - B-cell abnormalities (50-65%)
 - T-cell abnormalities (20-30%)
 - Phagocyte deficiencies (18%)
 - Complement deficiencies (2%)

Etiological approach**Indicators of possible PID**

Severe, **p**ersistent, **U**nusual & **r**ecurrent infections

Etiological approach**Indicators of possible PID**

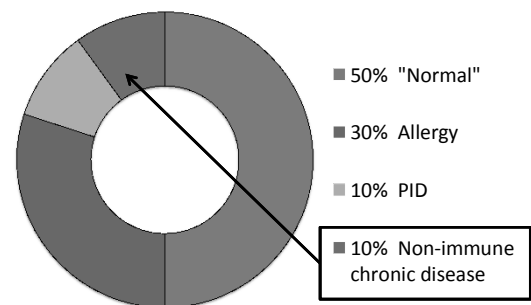
+

- Common associations:
 - Chronic muco-purulent secretions.
 - Allergy.
 - Persistent lymphopenia.
 - Lethargia & absenteeism.
 - FTT.
 - Recurrent diarrhoea.
 - Skin & soft tissue infections.
 - Two or more episodes of sepsis or meningitis.
 - Syndromic features.
 - Family history.
 - Complications from a live vaccine.
 - Auto-immune disease (adults).

Couriel J. British Medical Bulletin 2002;61: 115-132

Etiological approach**More frequent PID's in RRTI**

- Selective IgA deficiency:
 - Cannot be diagnosed < 4 years of age.
- IgG subclass deficiency:
 - Lack of ≥1 IgG subclasses with ± normal IgG, on 2 occasions while infection free, & inadequate vaccine responses.
- Transient hypogammaglobulinemia of infancy:
 - Decreased IgG with normal vaccine responses.
- Specific antibody deficiency:
 - Most common PID with recurrent sinupulmonary infections.
 - Cannot be diagnosed in children < 2 years of age.
- CVID:
 - Not uncommon but difficult to diagnose in preschool children.

Etiological approach**The child with non-immune chronic disease**

Stiehm et al, Approach to the child with recurrent infections, www.uptodate.com, Sep 2012
Christensen et al: Inborn immune deficiency, 2008.

Etiologic approach**The child with non-immune chronic disease**

- Ineffective mucus clearance:
 - CNS abnormality.
 - CF.
 - PCD.
- Obstruction:
 - Eustachian tube dysfunction.
 - Sinus ostia obstruction.
 - T&A hypertrophy.
 - Airway malacia & stenosis.
 - Lymph nodes & tumors.
 - Foreign body.
 - Vascular rings.
- CVS abnormalities with increased pulmonary blood flow.
- Congenital abnormalities.
- Chronic & resistant pathogens:
 - TB.
 - MRSA, PBP, lactam etc.
- Continuous re-infection.
- Irritant exposure:
 - Cigarette smoke.
 - GORD.

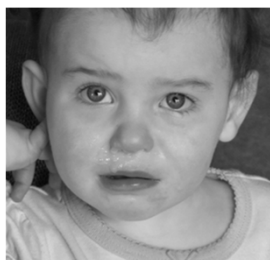
An Approach to the Child with RRTI's**Synopsis**

- Introduction
- Defining RRTI
- Etiological approach
- Crèche syndrome
- Conclude



Crèche syndrome**A medical syndrome?**

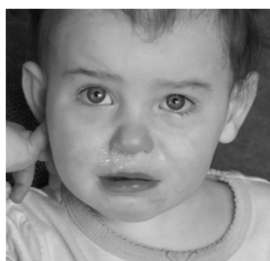
- Pubmed search:
 - About 4 results after 1 minute.
- www.uptodate.com:
 - No results.
- Google search:
 - About 5,560,000 results in 0.55seconds.

**Crèche syndrome****Clinical features according to Dr Google**

- “Exhausting roller coaster ride of never ending (airway) infections that starts on entry to crèche.”
- Chronic cough, phlegm production and lack of sleep.
- “Medical experts believe that it results from repeated attacks on the vulnerable & developing immune system.”
- Repeated doctor visits result in bankruptcy, repeated prescriptions for antibiotics, cortisone & other medication that does not help.
- Best to boost the immune system with omegas, vitamin supplements, propolis & probiotics.

Crèche syndrome**Etiology?**

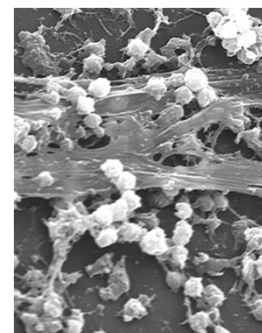
- Multifactorial & a composite:
 - Exposure to infections.
 - Immune incompetence.
 - Pathogen resistance.
 - Nutrient deficiency.
 - Energy depletion.
 - Medication side-effects.
 - Irritant exposure.
 - Allergy.



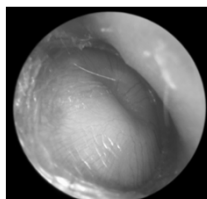
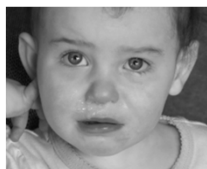
Are we missing the elephant in the room?

Crèche syndrome**Biofilm**

- Bacteria embedded in a polysaccharide matrix attached to a solid surface.
- Colonizing polysaccharide capsulated bacteria.
- Polysaccharide matrix forms a functional barrier against:
 - Phagocytosis.
 - Antibody & complement exposure.
 - Antibiotic penetration.

**Crèche syndrome****Protracted bacterial bronchitis: a biofilm disease**

- Usually young children <5 yrs.
- Persistent cough (>4 weeks):
 - “Wet” cough on reclining & early morning. May last the whole night.
 - “Out of breath” during coughing episodes.
 - Often worse during exercise.
 - Often coloured sputum.
- Responds to antibiotic therapy.
- Associated:
 - “Noisy chest” with chest rattles.
 - Other airway biofilm disease.



Craven V et al. Arch Dis Child. 2013;98(1):72-76.

Crèche syndrome**Protracted bacterial bronchitis (PBB)**

- Persistent infection of conducting airways by low colony count pathogenic bacteria:
 - NTHi.
 - *Streptococcus pneumoniae*.
 - *Moraxella catarrhalis*.
 - Often associated & exacerbated by viruses infections.
- Viral infection followed by polysaccharide capsulated bacteria?
- Colonisation after Caesarian section?
- Polysaccharide nonresponsiveness children are sent to crèche at young age?

Crèche syndrome**Protracted bacterial bronchitis**

- Treatment:
 - Prolonged antibiotic courses.
 - Based on sensitivity.
- Differential diagnosis of PBB:
 - Asthma.
 - Foreign body aspiration.
 - Cystic fibrosis.
 - Bronchiectasis.



“Undoubtedly a real & important entity.”

– Bush A. *Pediatr Clin N Am*; 2009: 67-100

Craven V et al. *Arch Dis Child*. 2013;98(1):72-76.

An Approach to the Child with RRTI's**Synopsis**

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**An Approach to the Child with RRTI's****Conclude**

RRTI represents a very common & challenging problem in private paediatric medicine.

**An Approach to the Child with RRTI's****Conclude**

Clinical judgement & experience remains crucial in current management.

**An Approach to the Child with RRTI's****Conclude**

The current lack in evidence & a dire need for guidelines should be adressed.

**An Approach to the Child with RRTI's****Conclude**

Sound definitions & approach plans will benefit patients, doctors & parents!



An Approach to the Child with RRTI's

Conclude

Key to not over-investigate or over-treat, while also not allowing long term harm.



An Approach to the Child with RRTI's

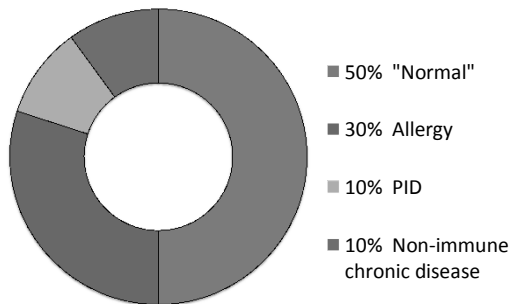
Conclude

Take note of the emerging science of biofilm disease & chronic airway colonization with polysaccharide capsulated pathogens.



Conclude

Main reasons to RRTI



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Thanking you!



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