An Approach to the Child with Recurrent Respiratory Tract Infections

Synopsis

Introduction
Defining RRTI
Etiological approach
Creche syndrome
Conclude

Introduction

• 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 parents

• 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?
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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!

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 IV 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).


Take parental concern into account!

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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.
**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**

- 50% “Normal”
- 30% Allergy
- 10% PID
- 10% Non-immune chronic disease

**Etiological approach**

**“Normal” child with RRTI’s**

- 50% “Normal”
- 30% Allergy
- 10% PID
- 10% Non-immune chronic disease

**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)

- 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!

**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!

**Etiological approach**

**The allergic child with RRTI’s**

- 50% “Normal”
- 30% Allergy
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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.


Etiological approach

The PID child with RRTI’s

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


Etiological approach

Blurring the edges between allergy & PID

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

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, persistent, unusual & recurrent infections

Common associations:
- Chronic mucopurulent secretions.
- Allergy.
- Persistent lymphopenia.
- Lethargy & 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).

Common associations:
- 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.

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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.

The child with non-immune chronic disease

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A medical syndrome?

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

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.

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?

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.

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.

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 nonresponsive 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."

Crèche syndrome

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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 addressed.

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

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Thanking you!

23rd Annual Congress of the Allergy Society of South Africa

6 – 8 August 2014

Elangeni Hotel, Durban

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