Reducing unnecessary antibiotic use in respiratory tract infections in children

-a secondary care perspective

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- Current recommendations
- Changing epidemiology of RTI's
- Risks of not giving antibiotics
- Spotting the child who need antibiotics

NHS
National Institute for
Health and Clinical Excellence

Respiratory tract infections - antibiotic prescribing

Implementing NICE guidance

2008

NICE clinical guideline 69

Clinical Guideline Implementation Tools

NGC69 Recommendations : Antibiotic prescribing options - 1

A no antibiotic prescribing strategy or a delayed antibiotic prescribing strategy should be agreed for most patients with the following conditions:

- Acute otitis media
- Acute sore throat/acute pharyngitis/acute tonsillitis
- Common cold
- Acute rhinosinusitis
- Acute cough/acute bronchitis

NGC69 Recommendations : Antibiotic prescribing options - 2

Immediate antibiotic prescribing and/or further investigation/management should only be offered to adults and children in the following situations:

- If the patient is systemically very unwell
- If the patient has symptoms and signs of serious illness and/or complications
- If the patient is at high risk of serious complications because of pre-existing comorbidity

NCG 69 Recommendations : Antibiotic prescribing options - 3

Depending on clinical assessment of severity, patients in the following subgroups can also be considered for immediate antibiotics:

- Children younger than 2 years with bilateral acute otitis media
- Children with otorrhoea who have acute otitis media
- Patients with acute sore throat/acute pharyngitis/acute tonsillitis when three or more Centor criteria are present

NCG 69 Recommendations : When no antibiotic prescribing is agreed

Offer patients:

- Reassurance that antibiotics are not needed immediately
- Signs of worsening
- A clinical review if the condition worsens or becomes prolonged

The changing epidemiology

Finland: changes in infectious diseases mortality over 3 decades

(*Pediatr Infect Dis J* 2013;32: e355–e359)

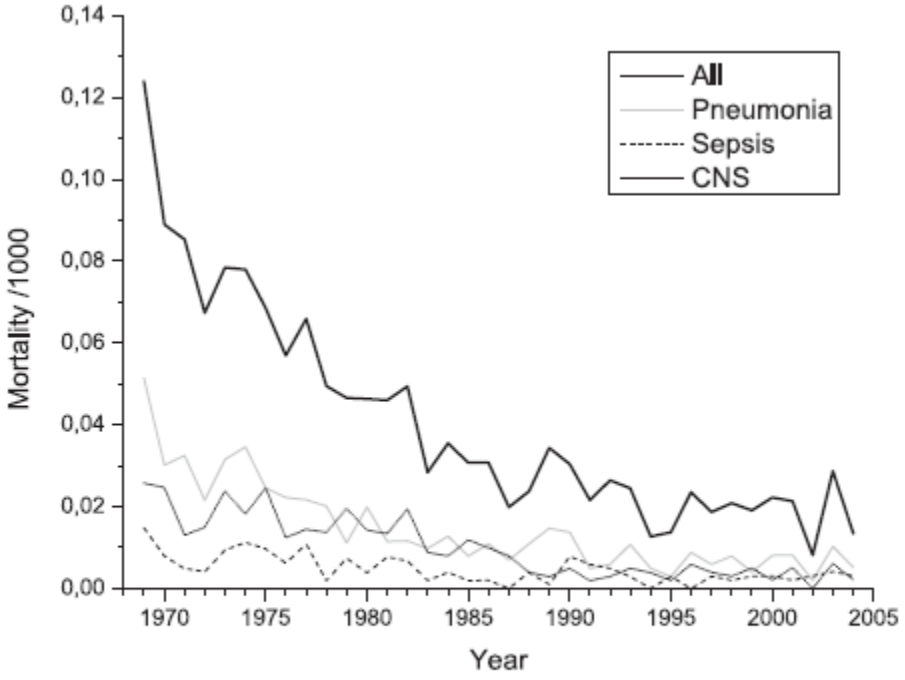


FIGURE 1. Childhood mortality from all infections, pneumonia and other lower respiratory tract infections, septicemia and CNS infections in Finland, 1969 to 2004.

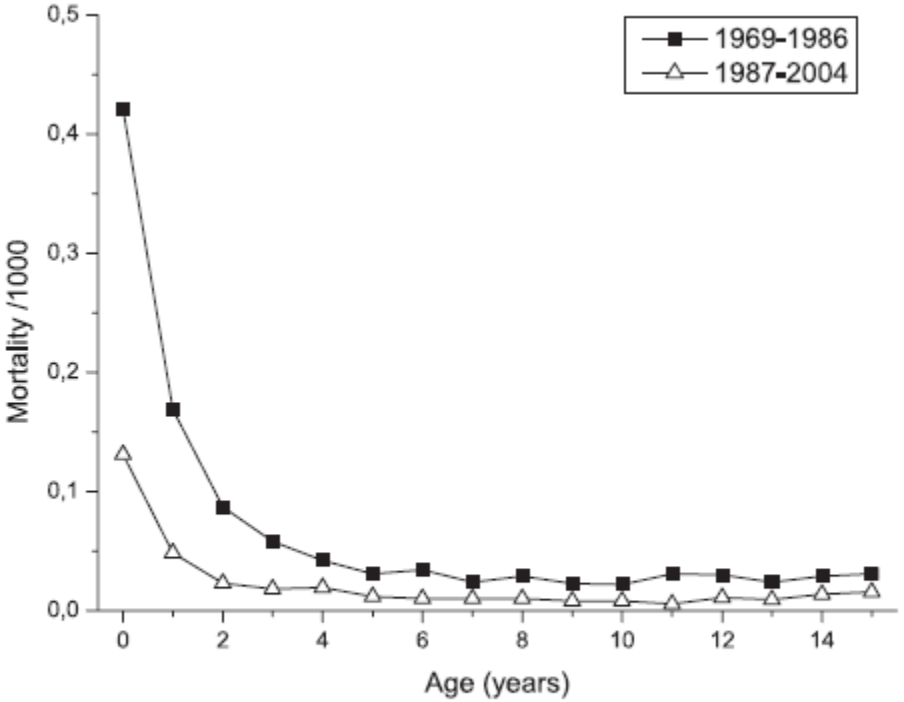
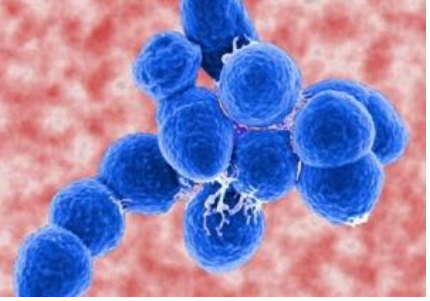


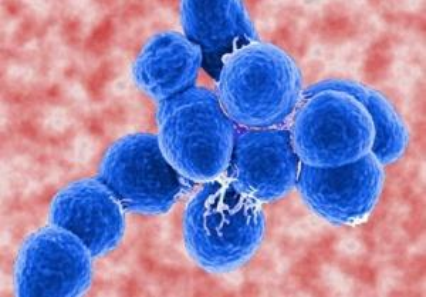
FIGURE 2. Age-specific mortality from infections in 2 cohorts (1969 to 1986 and 1987 to 2004), excluding those who died during the first month of life.



Streptococcus Pneumonia

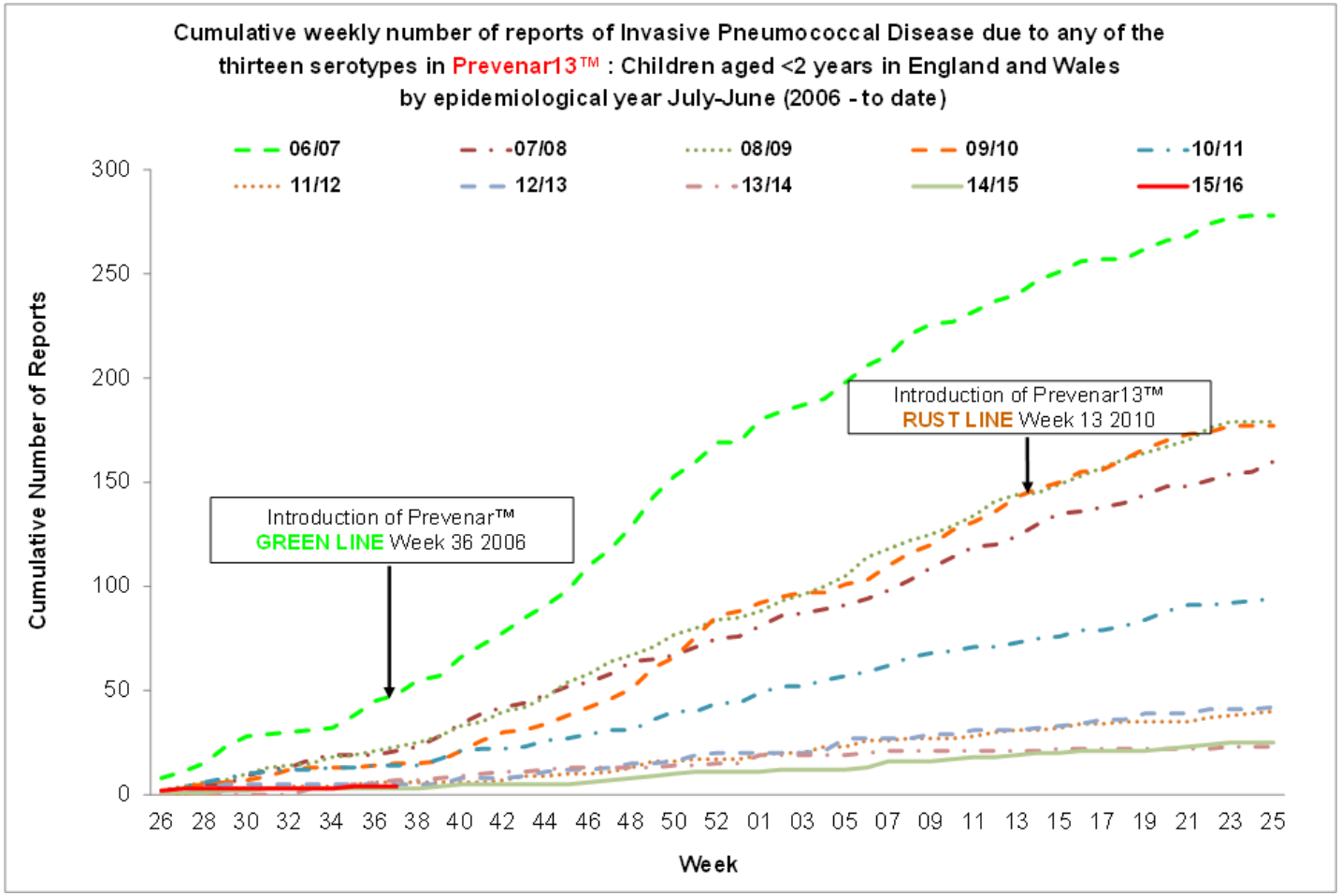
- Capsule - major virulence factor
- Over 90 different capsular types have been characterised
- Prior to PCV 80% of invasive infections in children were caused by eight to ten capsular types

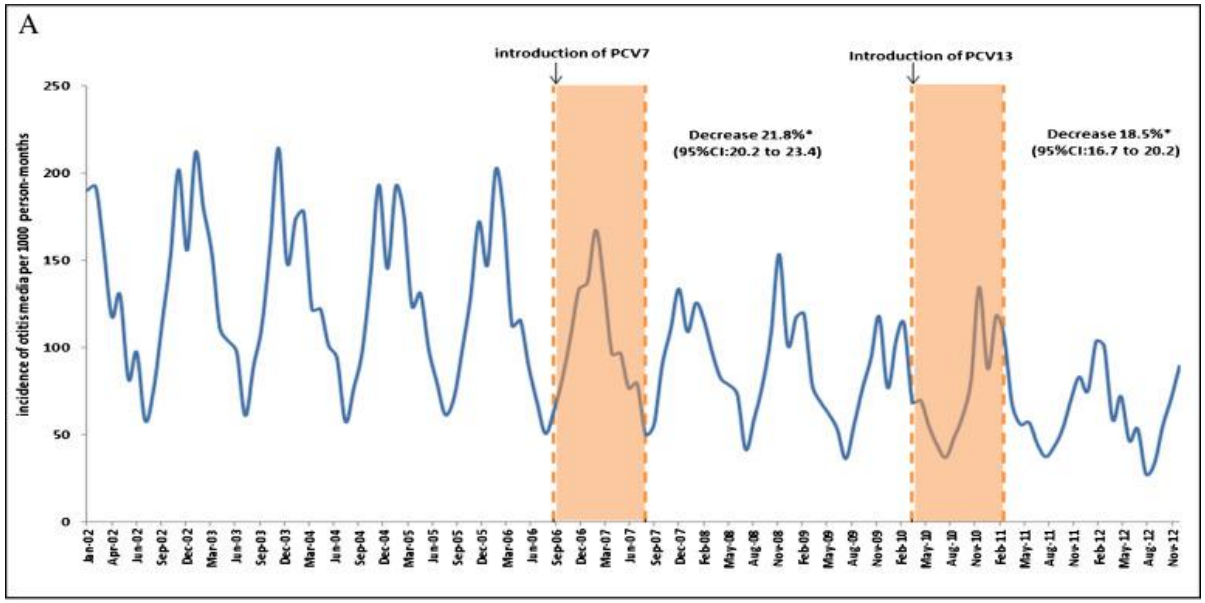
- Most freq cause of bacteraemia (community acq) and meningitis
- Major cause of morbidity/mortality
- Particularly problematic in under 2's, immunocompromised, asplenics



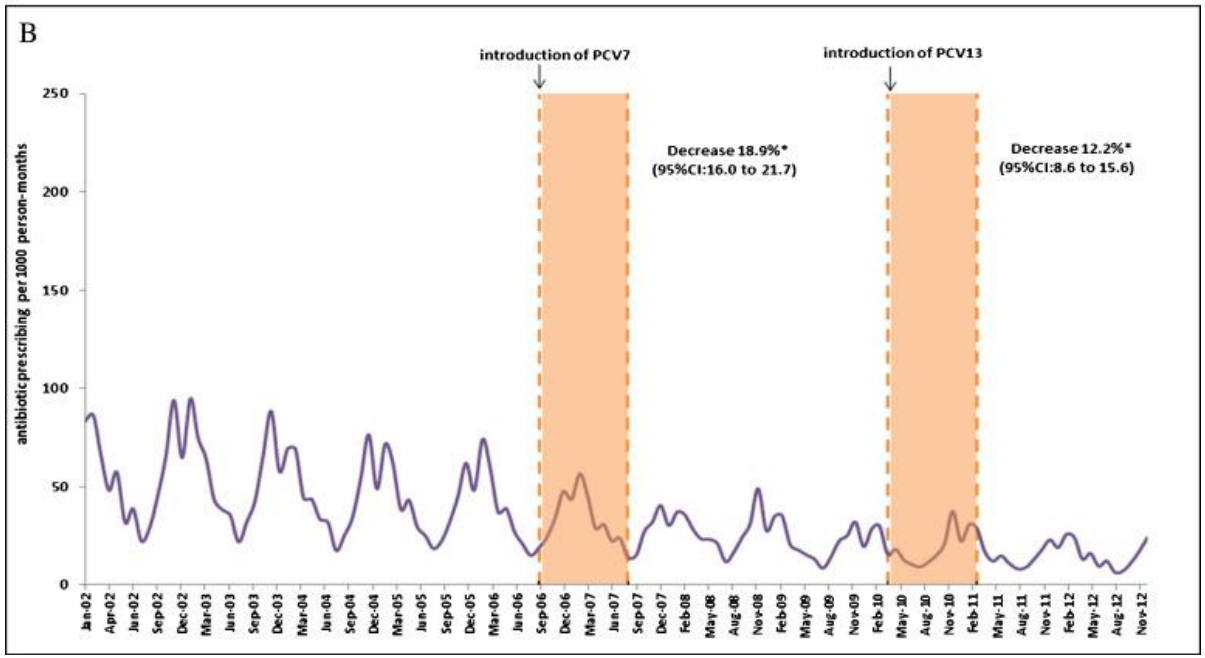
Streptococcus Pneumonia

Health Protection England Data





Impact of pneumococcal conjugate vaccines on childhood otitis mediain the United Kingdom



Vaccine 33 (2015) 5072–5079

Risks of not giving antibiotics

Current Opinion in Infectious Disease 2010, 23: 242-8

- AOM and mastoiditis risk

  Antibiotics halved the risk of mastoiditis. General practitioners would need to treat 4831 otitis media episodes with antibiotics to prevent 1 child from developing mastoiditis. (Ped 2009 123(2):424-30

- Tonsillitis and peritonsillar abscess

  Risk of 3.9/10000 vs 4.9 per 10,000 if not given antiobiotics
  i.e. Not giving antibiotics would result in 1 additional case per 10,000 children with tonsillitis (BMJ 2007; 335:982)

- URTI and pneumonia

  Risk of pneumonia of children treated with antibiotics for URTI was 5.7 per 10,000 vs 8.8 per 10,000 for those not treated
  i.e. Not prescribing antibiotics for those presenting with URTI's would result in additional 3.1 cases of pneumonia per 10,000 (BMJ 2007; 335:982)

Spotting the vulnerable child

- The very young
- The unimmunised
- Immunocompromised
- Significant co-morbidities

The very young (< 3 months)

Pregnancy and immunity

- Immune system functionally immunodeficient at birth
- Move from sterile environment to pathogenic
- ‘immunosuppressive’ environment of womb moving to ‘dampened’ responsiveness to avoid inflammatory responses to benign/harmless ag’s
- Increased susceptibility to pathogens and reduced responses to vaccines in neonates

Transfer of protection

- Immunoglobulin – IgG – predom in third trimester
- Breast-feeding

Maternal and child undernutrition: global and regional exposures and health consequences

*Robert E Black, Lindsay H Allen, Zulfiqar A Bhutta, Laura E Caulfield, Mercedes de Onis, Majid Ezzati, Colin Mathers, Juan Rivera, for the Maternal and Child Undernutrition Study Group**

Outcome	0–5 months			6–23 months
	Predominant breastfeeding	Partial breastfeeding	Not breastfeeding	Not breastfeeding
All cause mortality	1·48 (1·13–1·92)[34,81,89]	2·85 (1·59–5·10)[34,88,89]	14·40 (6·09–34·05)[34,88]	3·68 (1·46–9·29)[34,90]
Diarrhoea mortality	2·28 (0·85–6·11)[34,88]	4·62 (1·81–11·77)[34,88]	10·53 (2·80–39·64)[34,88]	2·83 (0·15–54·82)[34]
Pneumonia mortality	1·75 (0·48–6·43)[34,88]	2·49 (1·03–6·04)[34,88]	15·13 (0·61–373·84)[34,88]	1·52 (0·09–27·06)[34]
Diarrhoea incidence	1·26 (0·81–1·95)[91]	3·04 (1·32–7·00)[91,92]	3·65 (1·69–7·88)[91,92]	1·20 (1·05–1·38)[91–93]
Pneumonia incidence	1·79 (1·29–2·48)[93]	2·48 (0·23–27·15)[91]	2·07 (0·19–22·64)[93]	1·17 (0·37–3·65)[93]

Data are point estimate (95% CI), references.

Table 4: Relative risk of suboptimum breastfeeding (compared with exclusive breastfeeding from 0 to 5 months and any breastfeeding from 6 to 23 months)

Severity scoring and children

Age Group	Respiratory Rate	Heart Rate	Systolic Blood Pressure
Newborn	30 - 50	120 - 160	50 - 70
Infant (1-12 months)	20 - 30	80 - 140	70 - 100
Toddler (1-3 yrs.)	20 - 30	80 - 130	80 - 110
Preschooler (3-5 yrs.)	20 - 30	80 - 120	80 - 110
School Age (6-12 yrs.)	20 - 30	70 - 110	80 - 120
Adolescent (13+ yrs.)	12 - 20	55 - 105	110 - 120

pneumonia.wmv

Development and internal validation of a clinical rule to improve antibiotic use in children presenting to primary care with acute respiratory tract infection and cough: a prognostic cohort study

Lancet Respir Med 2016

- 8394 children aged between 3 months and 16 years presenting with acute cough

- Outcome was hospital admission within 30 days (n=78) not confirmed bacterial infection (27% of all discharge summaries were suggestive of possible bacterial cause)

No evidence of assoc between hosp admission and prescription of antibiotics 32% vs 37%

	Data source	Odds ratio†	95% CI	p value
Current asthma ‡	Notes review	3·93	2·20–7·03	<0·001
Inter and subcostal recession	Clinician	3·82	2·23–6·62	<0·001
Age of child (<2 years)	Parent	3·42	2·12–5·58	<0·001
Illness duration (<4 days)	Parent	2·77	1·77–4·35	<0·001
Moderate-to-severe vomiting in the last 24 h§	Parent	2·56	1·54–4·31	<0·001
Wheeze	Clinician	2·16	1·28–3·60	0·004
Body temperature >37·8°C or parent-reported severe fever in the last 24 h	Clinician or parent	1·99	1·22–3·25	0·006

*Model includes 8340 (99·4%) of 8394 cohort participants; the original model intercept coefficient was −6·65 (95% CI −7·21 to −6·10), suggesting that the probability of hospital admission for children with no predictors was 0·14%. †Odds ratios calculated using shrunken estimates from the bootstrap internal validation calibration slope. ‡Defined as present if asthma in medical notes and asthma drugs issued in the previous 12 months. §Including after cough.

Table 2: Final multivariable* predictors of hospitalisation (all p<0·01)*

Development and internal validation of a clinical rule to improve antibiotic use in children presenting to primary care with acute respiratory tract infection and cough: a prognostic cohort study

Lancet Respir Med 2016

Mneumonic **STARWAVe** distinguished 3 hospital admission strata

S	Short duration i.e. < 3 days
T	Temperature i.e. T>37.8 or parent reported severe fever in last 24hrs
A	Age i.e. <24 months
R	Recession
W	Wheeze
A	Asthma
V	Vomiting

If antibiotic prescription in low risk group halved, remained static in the mid risk group and increased to 90% in the high risk group then overall there would be a 10% drop in prescribing

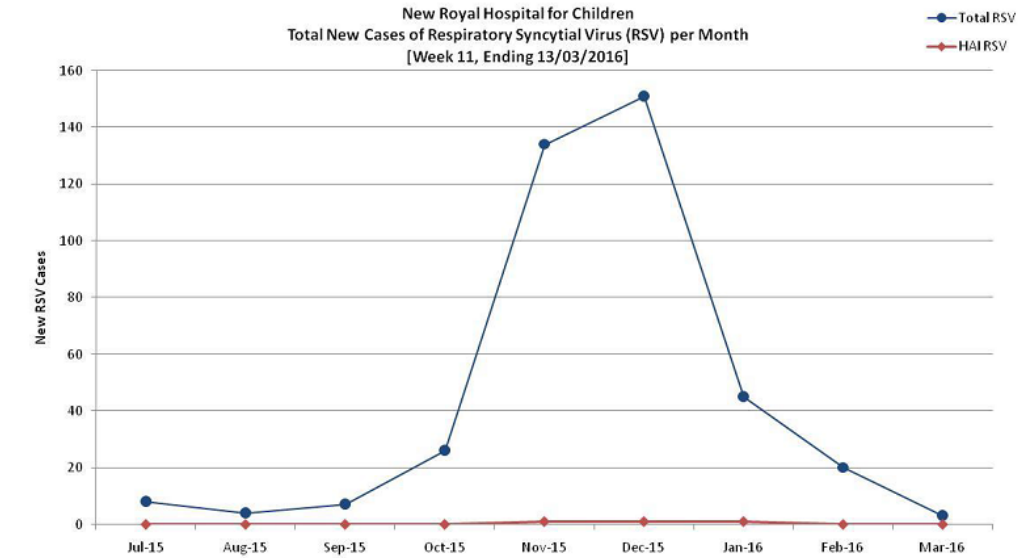
≤ 1 point	0.3% chance of admission
2-3 points	1.5% chance of admission
≥ 4 points	12% chance of admission

Bronchiolitis

1 in 3 under 1's will develop clinical bronchiolitis

2-3% of all infants will require hospitalisation

Clinical diagnosis: coryzal illness followed by persistant cough, tachypnoea, chest recession & wheeze or crackles



	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16
Total RSV	8	4	7	26	134	151	45	20	3
HAI RSV	0	0	0	0	1	1	1	0	0

NG9 (2015) Bronchiolitis

Do not use any of the following to treat bronchiolitis in children:

- antibiotics
- hypertonic saline
- adrenaline (nebulised)
- salbutamol
- montelukast
- ipratropium bromide
- systemic or inhaled corticosteroids

Red Flags

- worsening work of breathing (for example grunting, nasal flaring, marked chest recession)
- fluid intake is 50–75% % of normal or no wet nappy for 12 hours
- apnoea or cyanosis
- exhaustion (for example, not responding normally to social cues, wakes only with prolonged stimulation)

NG9 (2015) Bronchiolitis
Safety netting

When caring for your child at home, you need to know these important signs and if they may be getting worse so you can get help as quickly as you can:

- breathing becoming harder work – this may mean they're making an 'effort noise' every time they breathe out (often called grunting), flaring their nostrils, their chest might 'suck in' between the ribs, or they may use their stomach to breathe
- not taking in enough feeds (half to three quarters of normal, or no wet nappy for 12 hours) – these are signs they might be dehydrated
- pauses in their breathing for more than 10 seconds (apnoea)
- skin inside the lips or under the tongue turning blue (cyanosis)
- exhaustion (not responding as they usually would, sleepy, irritable, floppy, hard to wake up).

Antibiotics and RTI's in children