

# Vital signs

What is their value in detection of significant acute infection

# Present ( preliminary findings only)

1. Early results from RCPCH retrospective analysis of data “ recognising acute illness in children”
2. A Pilot Study from one acute general hospital unit.

# Both studies-aim

- Can simple clinical data be used to
  - Identify bacterial from viral illnesses with sufficient utility and safety.
  - For use in early course acute illness ( taking account of the age).
  - And guide need for hospital care

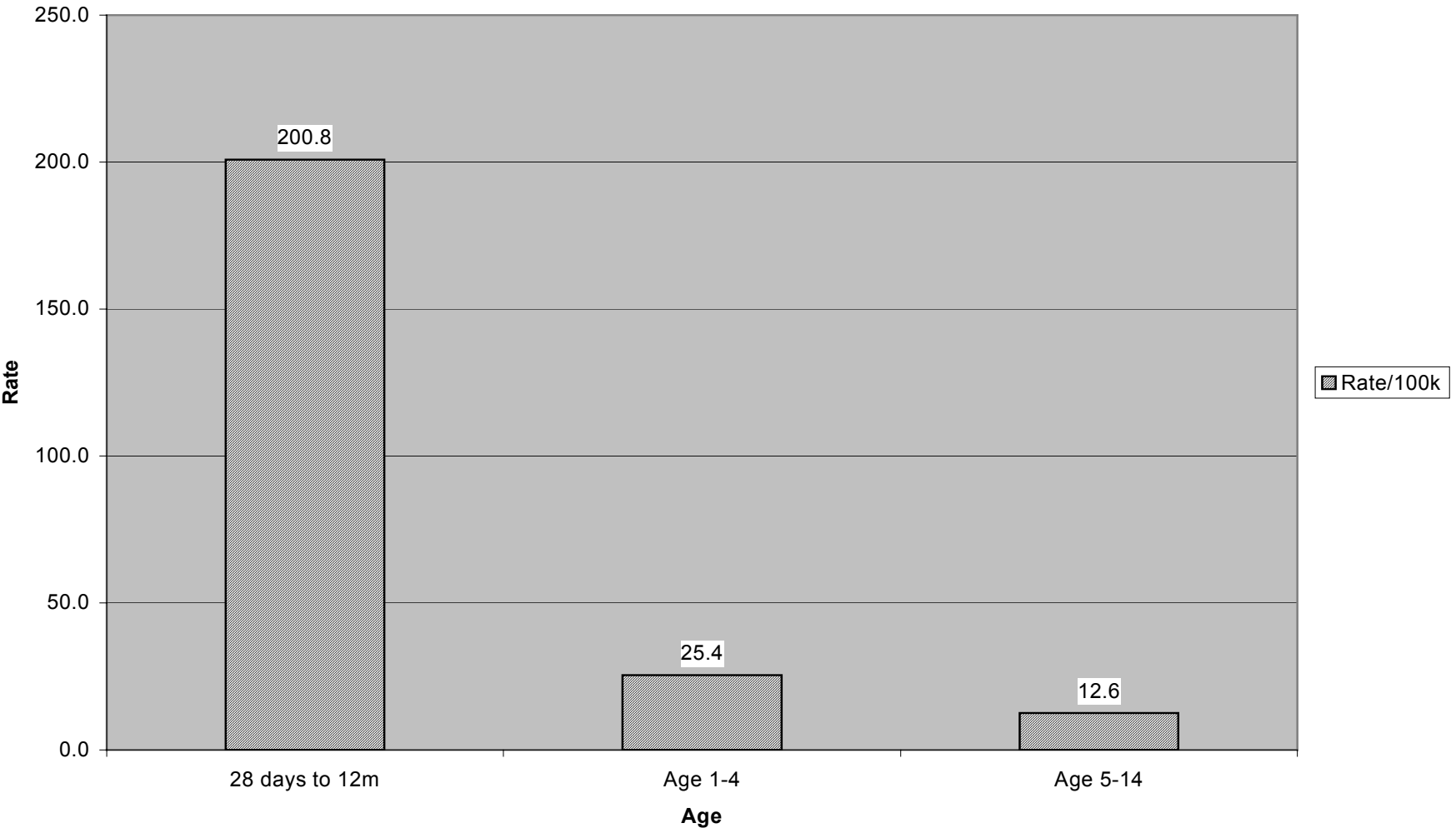
# Background

# Infection

- Distinction viral from significant bacterial illness ( SBI) – difficult esp in young children
- “Self limiting “ includes both viral and SBI
- Infection probably the commonest trigger for death in children aged  $> 28$  days &  $< 5$  yrs in England

# Child mortality rate

Mortality rates



# Reduction of deaths needs ( additional to prevention)

- Better healthcare-
  - Earlier diagnosis and treatment

# Acute presentations- 80% in following

- Breathing difficulty ( some feverish)
- Feverish illness
- D&V
- Fit
- ( Rash)
- AND
  - *Most result in a clinical assessment*

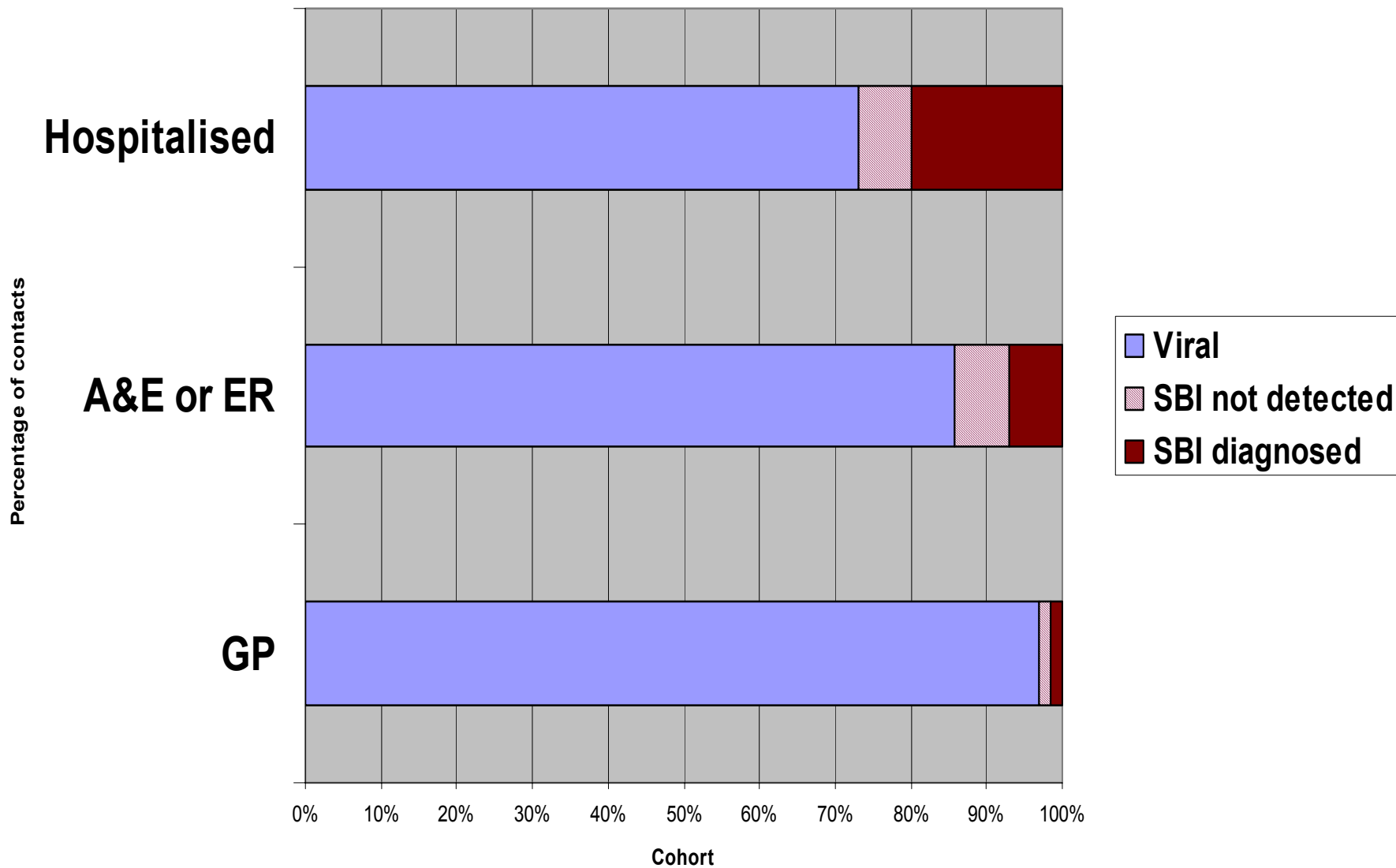
# Morbidity vs risk

- Young infants and children become ill (and recovery) quickly
- Most experience a mild illness
- Identification of life or organ threatening severe progressive disease *requires sequential observation*

# Children – emergency care in UK

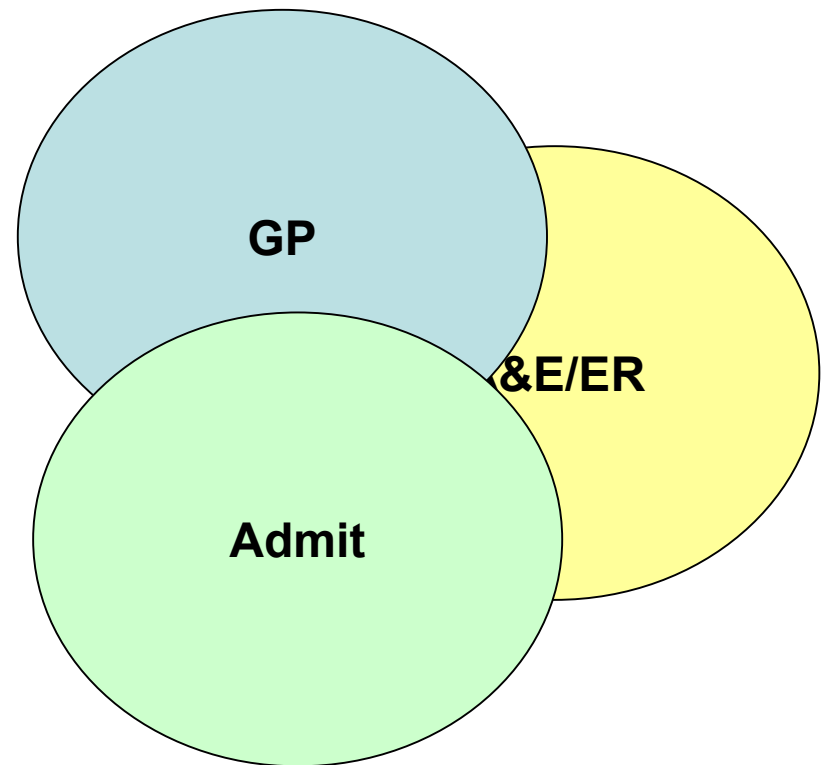
- GP
- NHS direct
- Pharmacy
- Walk in Centres
- Minor Injury Units
- A&E
- Paediatric hospital care

# Differing SBI illness prevalence in 100 children

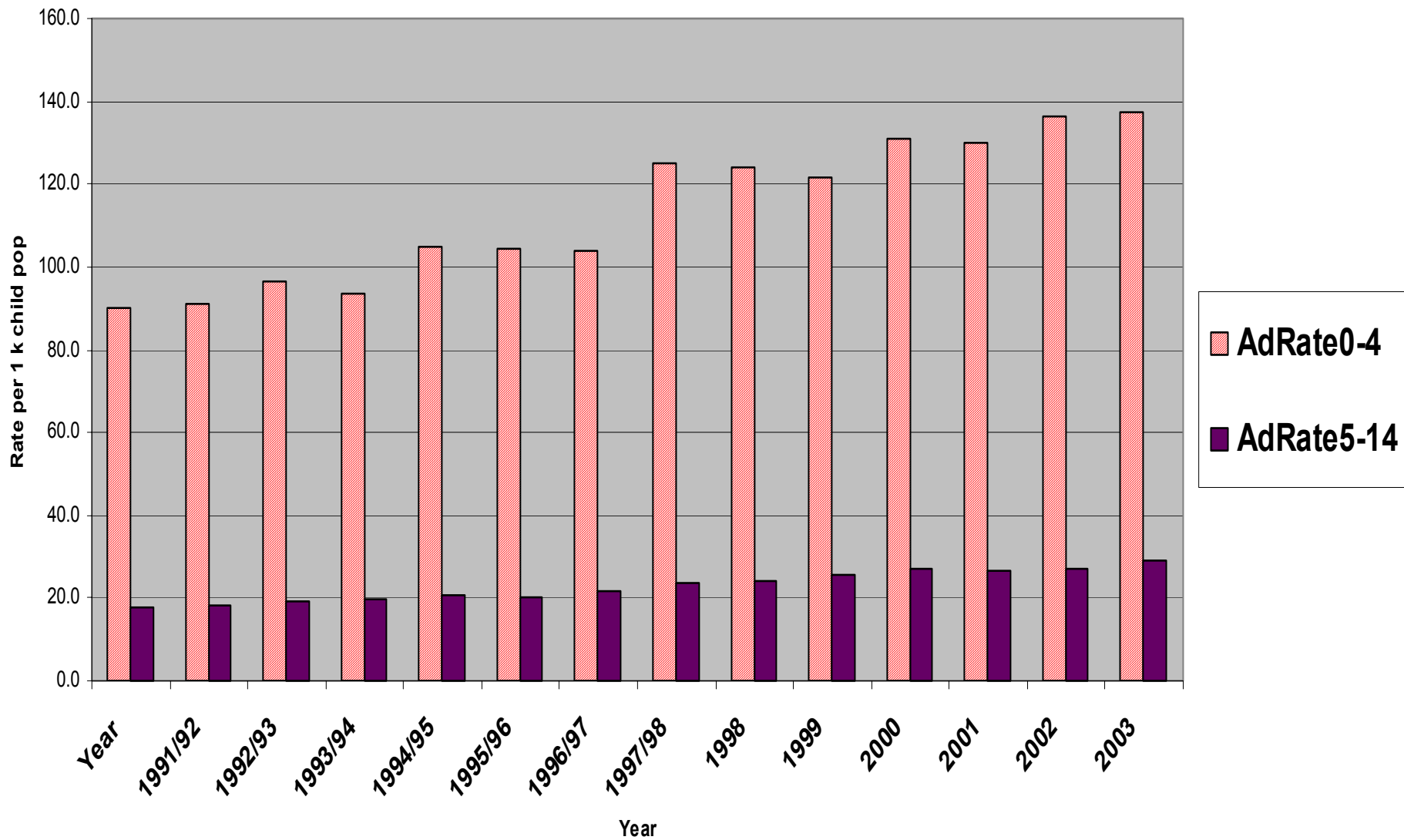


# Contacts in 1000 children aged under 5 yr per yr

- GP
  - 6000
  - referred= ? 10% (acute)
- A&E or ER
  - 250
  - hospitalised = 25 %
- Hospitalised
  - 100

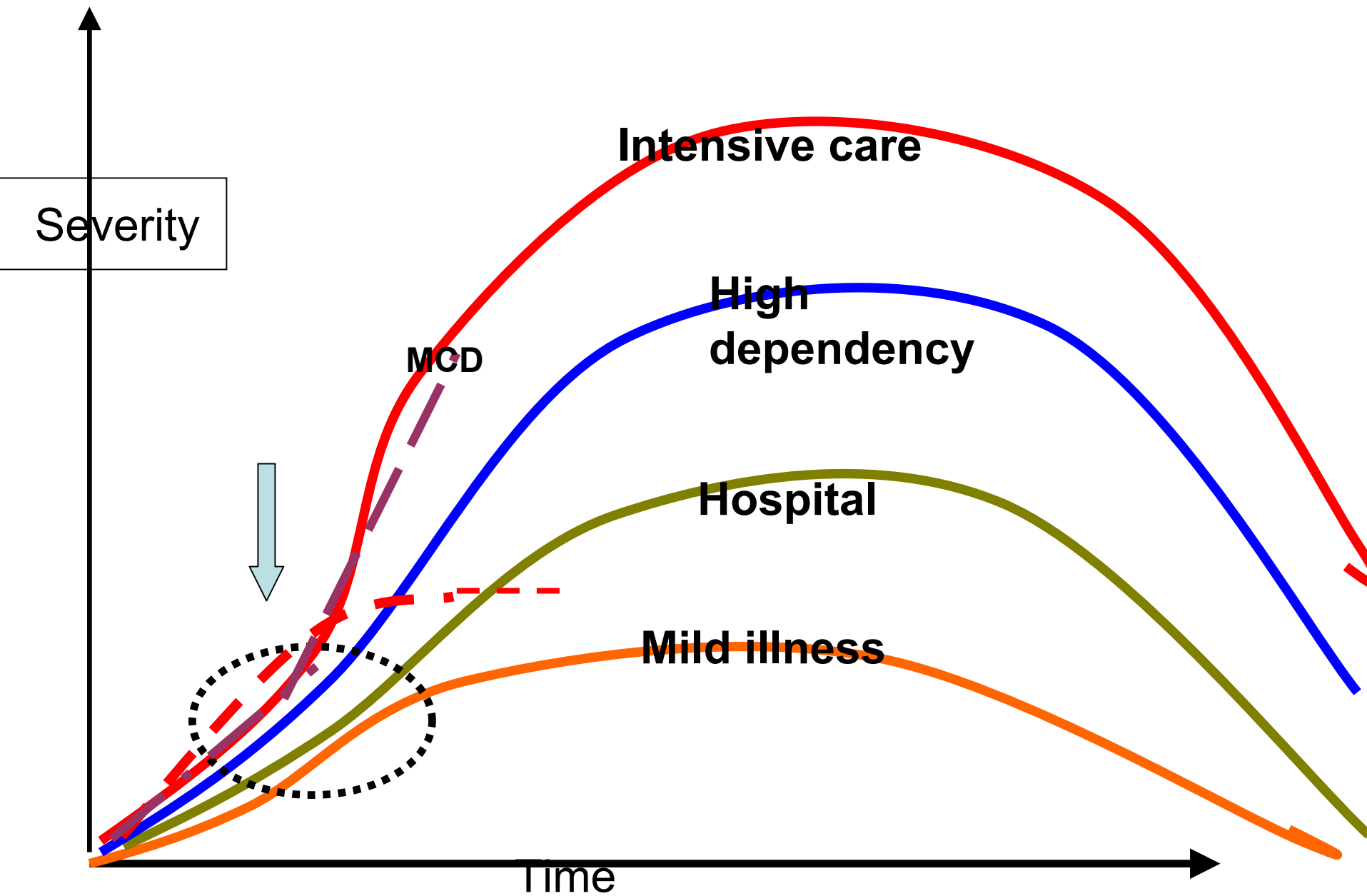


# Paediatric Admission rates per 1000 child population (England)



# Prevalence of SBI in paediatrics

<i>All England Admissions in 2003</i>	<i>Number</i>	<i>SBI</i>	<i>Prevalence</i>
All Paediatric Admissions	574785	27059	5%
Without Asthma, bronchiolitis, injuries, diabetes, neoplasms,epilepsy and social admissions	451263	27059	6%
W.o above and also D&V	404394	27059	7%
Admitted with feverish illness)	100404	27059	27%



# Presentation

- Preliminary results of
  - [1]early analysis from RCPCH study
  - [2]Work in progress at Pinderfields Wakefield
- Note neither yet reached firm conclusions nor peer reviewed
- Data is provided today for discussion and views

First : RCPCH Study – recognising  
acute illness in children

# Data used

- National case control study of children with Meningococcal disease ( n= 448 ) 1/3 of whom died.
- Children attending Nottingham A&E majority self referring (n=1792 ) at presentation not critically - ill of whom 2/3 were discharged without admission

# For each

- Recorded ( and reviewed) discharge diagnosis for A&E set
- Presence of significant bacterial illness
  - 100% in MCD set
  - 5 % of the A&E set

For each set – used the first recorded

- Temperature, Pulse rate, Respiratory rate
  - “ TPR”
- Clinical
  - AVPU as measure of social/state
  - Rash
  - Capillary return

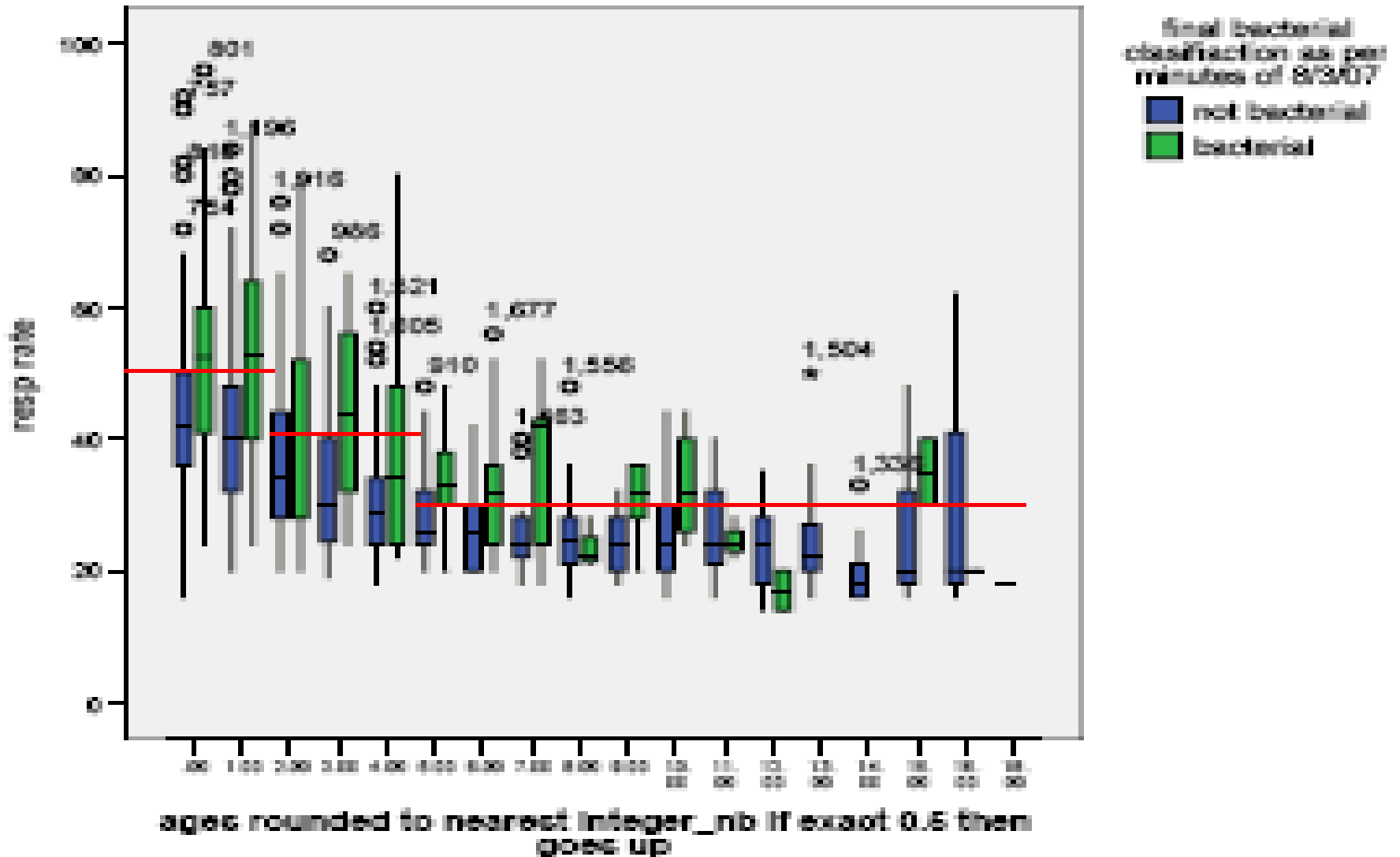
# Study :compared findings in

- Significant bacterial illness
- No significant bacterial illness :
  - self limiting viral illness
  - possible minor bacterial illness
  - minor bacterial illness with throat or urine culture positive but no signs of sepsis
  - No bacterial illness but initially managed as such

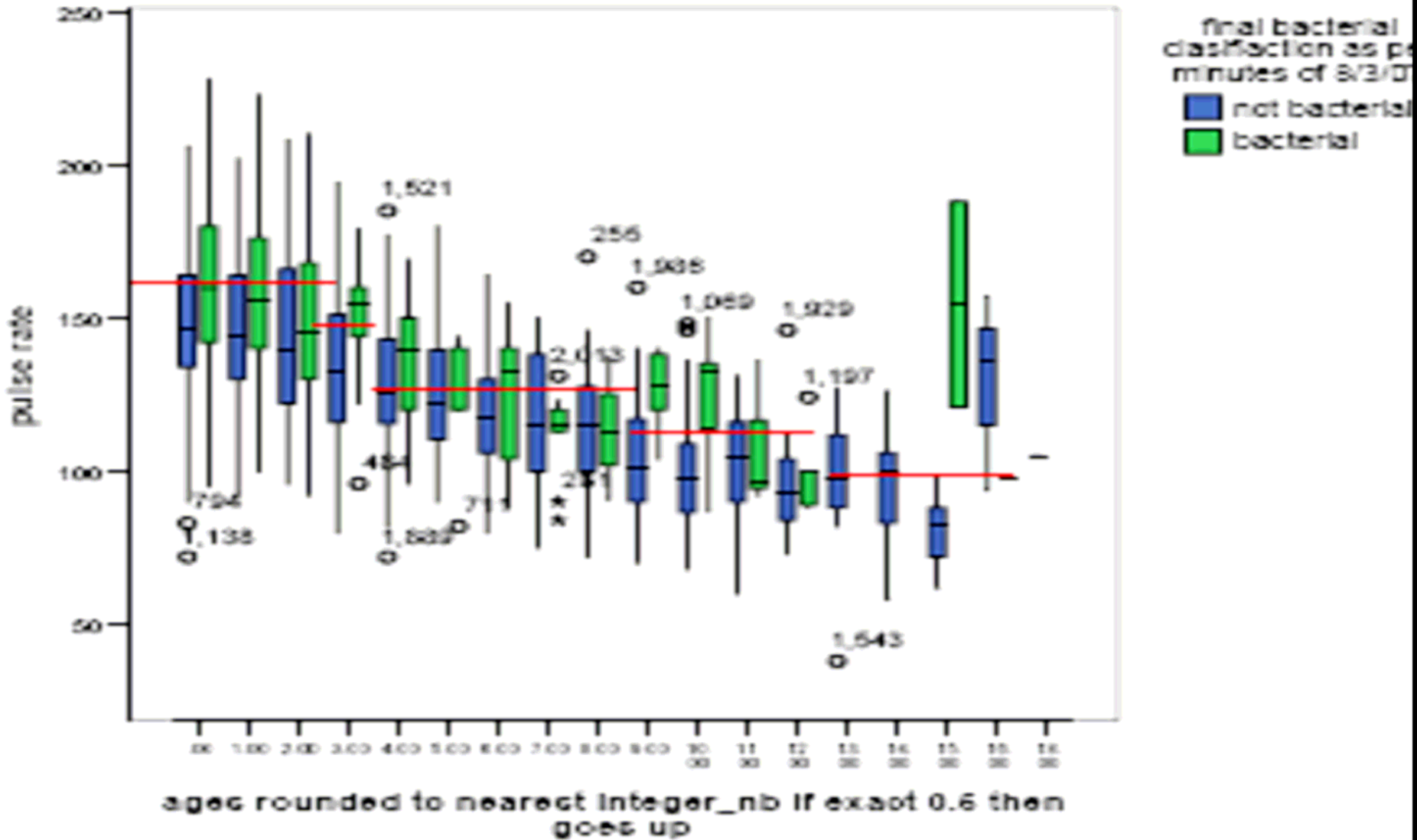
- Significant bacterial illness :
  - probable significant bacterial illness
  - definite significant bacterial illness
  - fatal bacterial illness
- Excluded
  - Asthma
  - Gastroenteritis
  - Diabetes



# RR bacterial green



# Pulse



# Three analyses presented- logistic regression data

- “Clinical “ assessment alone
  - AVPU, cap refill and rash
- Clinical assessment plus TPR
- Clinical plus Temp w/o PR
- Data handled by giving arbitrary score to
  - Presence / absence
  - Out of a “range “ for T or P or R

# For a simple clinician like myself !

- Sensitivity of 80 % means that we will “miss” 20%
- Specificity of 80% means that we shall *intervene* unnecessarily in 20 %

# Issues (1)

- What level of missed cases are we prepared to accept ?
- What is the cost to child/ parent / health service of unnecessary interventions
- What are the interventions which follow the assessment
  - Re assessment few hours later
  - Rx with antibiotics
  - Admit to hospital ( Ix and Rx)

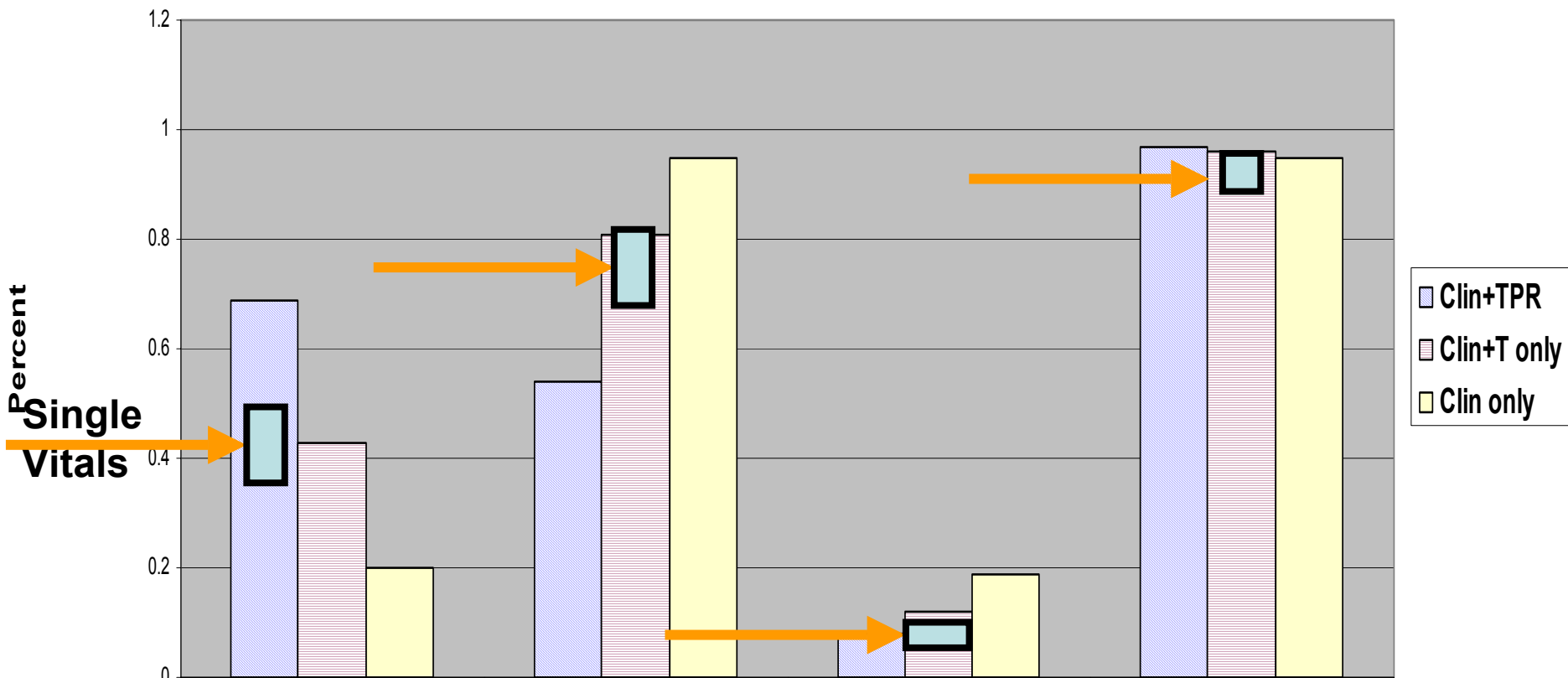
# A&E data set

- 1792 children all ages up to 15 years
  - 1/3 admitted, none died. Two received intensive care later
  - None of those sent home from A&E ( ER) had subsequent severe illness

# Meningococcal set

- National study of
  - all who died from MCD ( 103)
  - and 2 case controls same age , same area who had diagnosed MCD but did not die ( 345)

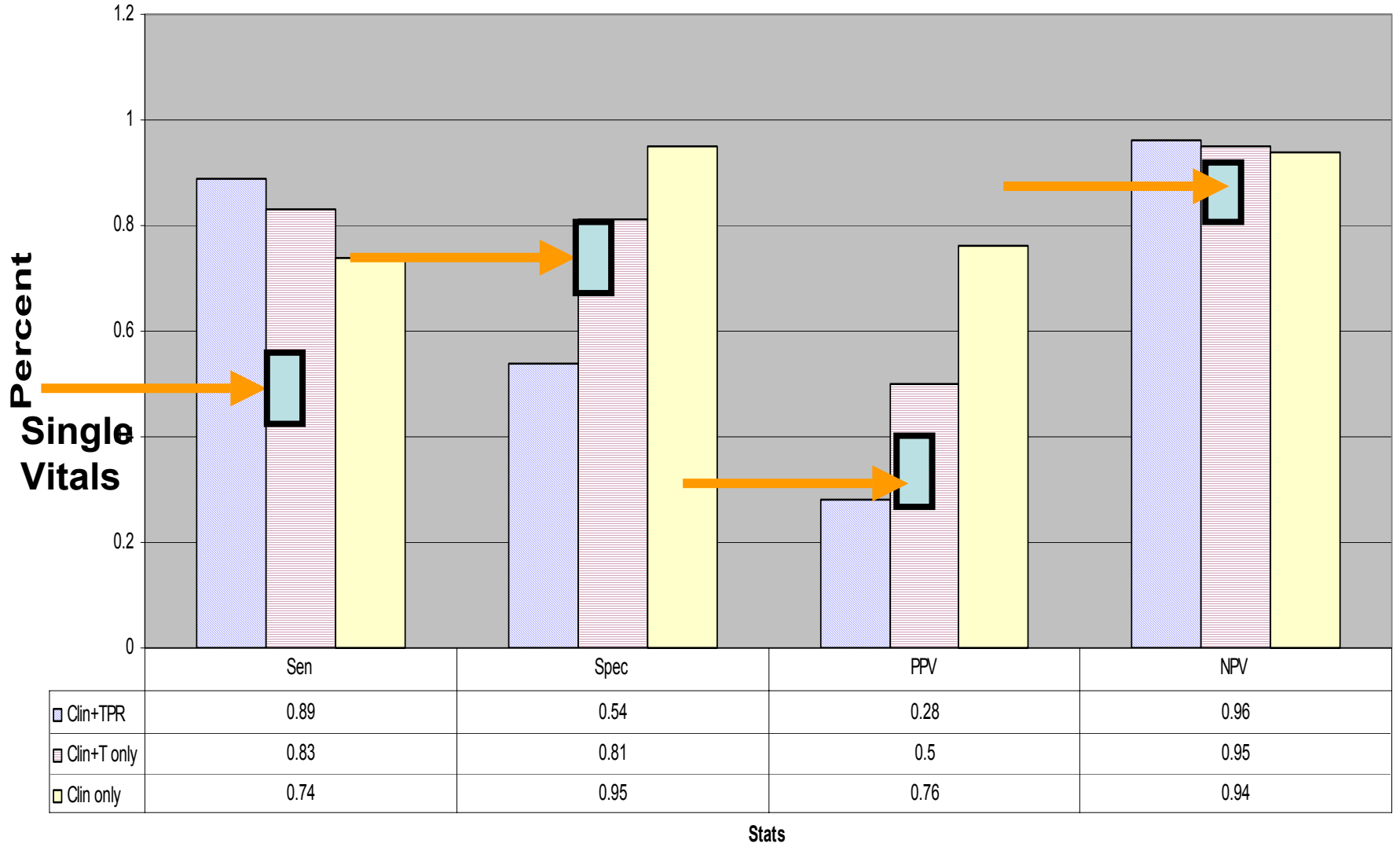
## Cluster Signs vs Single A&E cases only



	Sen	Spec	PPV	NPV
Clin+TPR	0.69	0.54	0.08	0.97
Clin+T only	0.43	0.81	0.12	0.96
Clin only	0.2	0.95	0.19	0.95

Stats

# A&E and MCD combined



# Second study:Pilot study

Pinderfields DGH

Wakefield

# Every child admitted

- The following record is completed as part of initial assessment by admitting doctor ( 90% and > compliance)

Pinderfields Hospital					How ill do you think the patient is? (please tick)					
Not ill <input type="checkbox"/>		Mildly ill <input type="checkbox"/>		Moderately ill <input type="checkbox"/>			Severely ill <input type="checkbox"/>			
		Life threatening <input type="checkbox"/>								
Temp	Heart Rate -		Resp Rate		Cap Refill sec					
Colour	Normal		Pale or Flushed or Mottled		Cyanotic or Ashen					
Response to social overture	Chats or smiles OR "alerts" (<2mo)		Single words or briefly smiles OR "alerts" briefly (<2mo)		No smile. Face anxious OR dull and expressionless or no "alertness"					
State variation	If awake stays awake OR if asleep and stimulated wakes quickly		Eyes close briefly and then awakens OR awakens after prolonged stimulation		Falls asleep when examined OR will not rouse					
Hydration	Skin normal, eyes normal and mucous membranes moist		Skin/eyes normal and mouth slightly dry		Skin doughy or tented and dry mucous membranes and/or sunken eyes					
Respiratory effort	No distress		Some distress eg recession		Laboured with grunt or nasal flare OR marked recession OR absent resps					
AVPU SCALE	Alert		Resp ondin g to voice	Responding to pain		Unresponsive				
Please rescore below 1 hr after antipyretic if temp was > 39						SaO <sub>2</sub> =				

# Pinderfields sample

- Random selection
  - 64 cases with diagnosis viral infection
- All 43 cases of sepsis admitted over the same period
  - See next

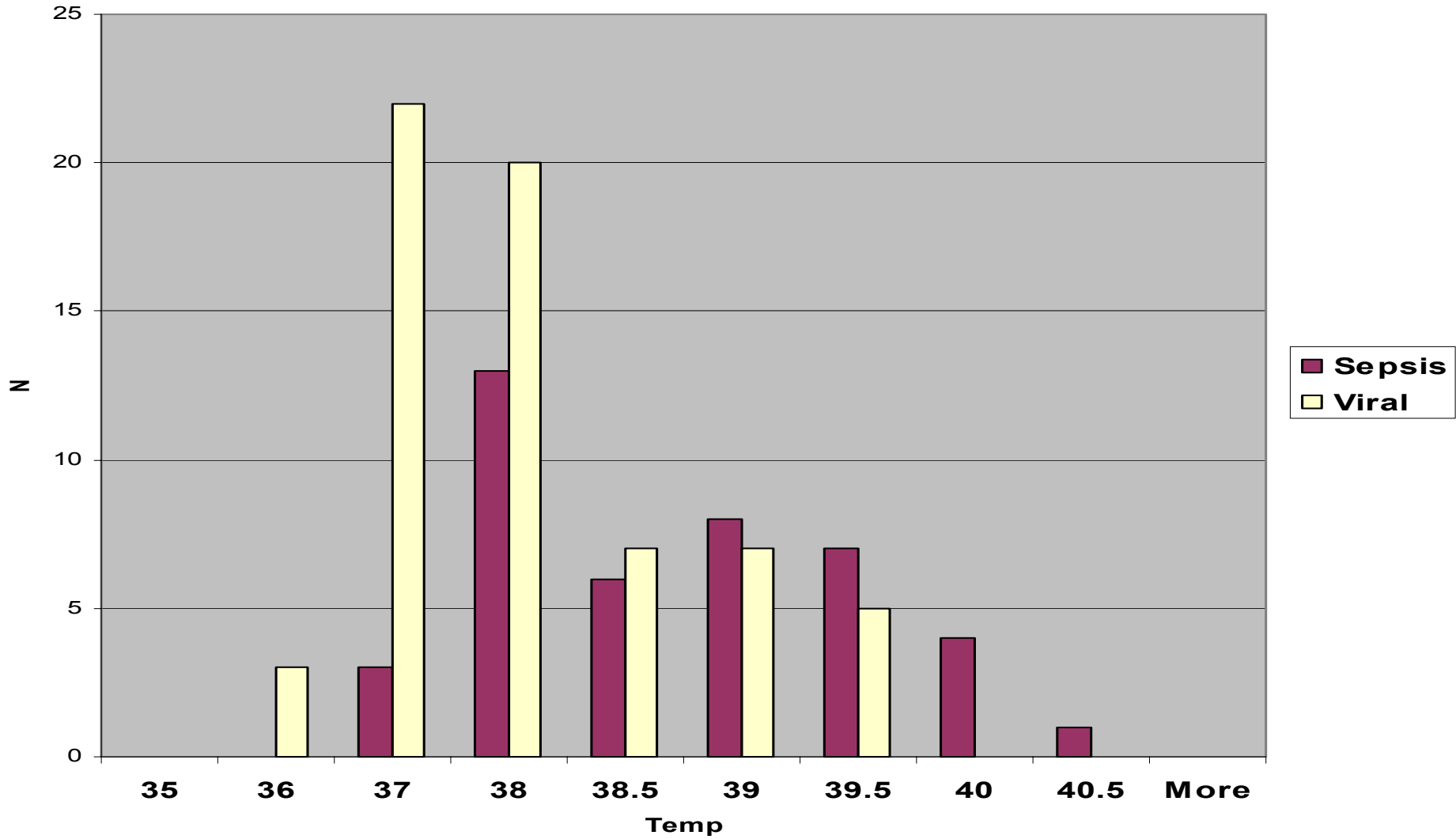
# Sepsis

meningococcal sepsis	11
pneumococcal bacteraemia	7
pneumococcal meningitis	3
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haemolytic strep bactaemia	2
probable bacteraemia	13
bacterial meningitis	6
haemophilus influenzae meningitis	1
	43

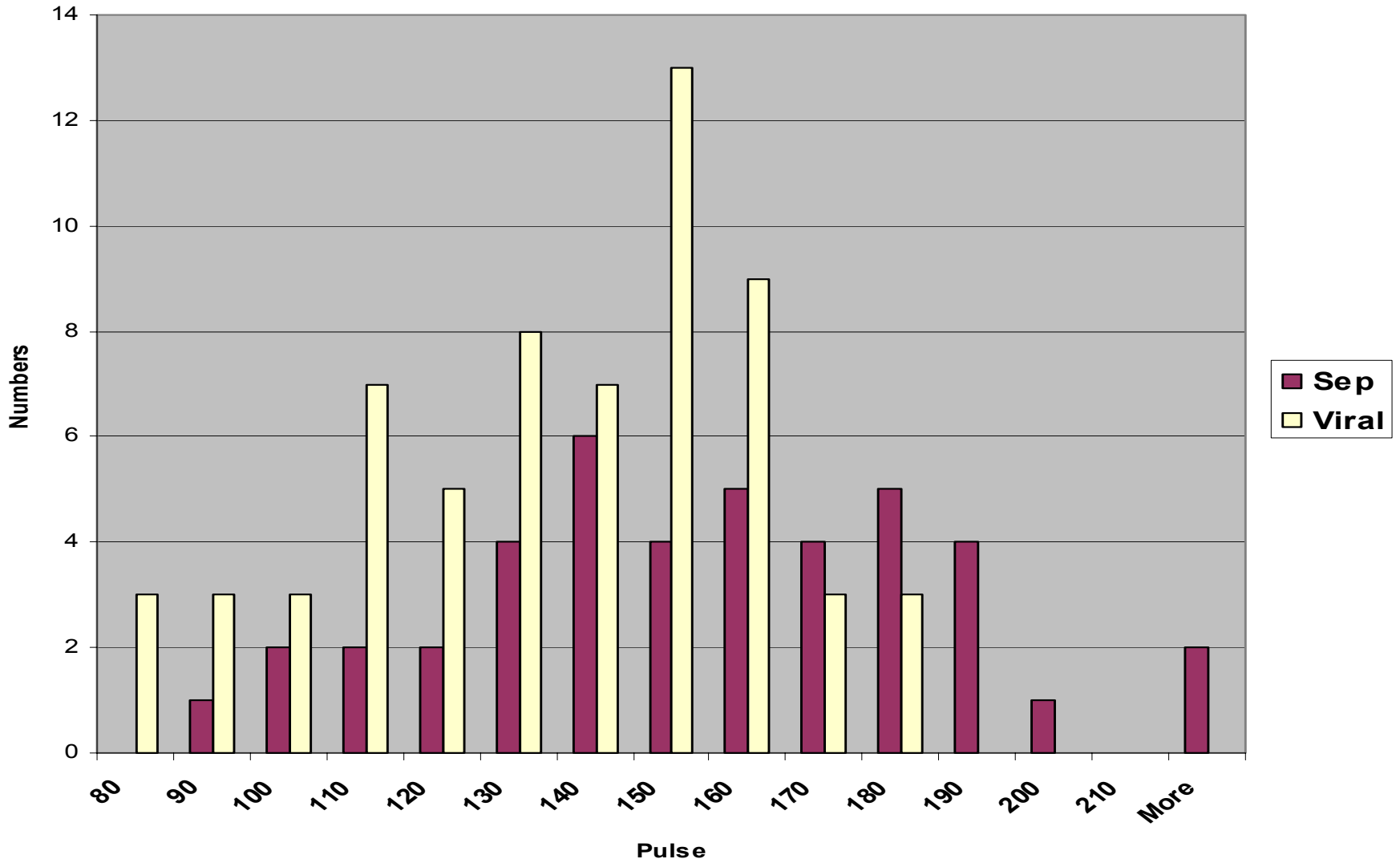
# General hospital study sample

- Strengths of sample
  - All with febrile illnesses have FBC, CRP, blood c/s and, if a cough + a CXR
  - Discharge Diagnosis recorded by consultant > 2 days post discharge with cultures available
  - > 90 % completion of dataform

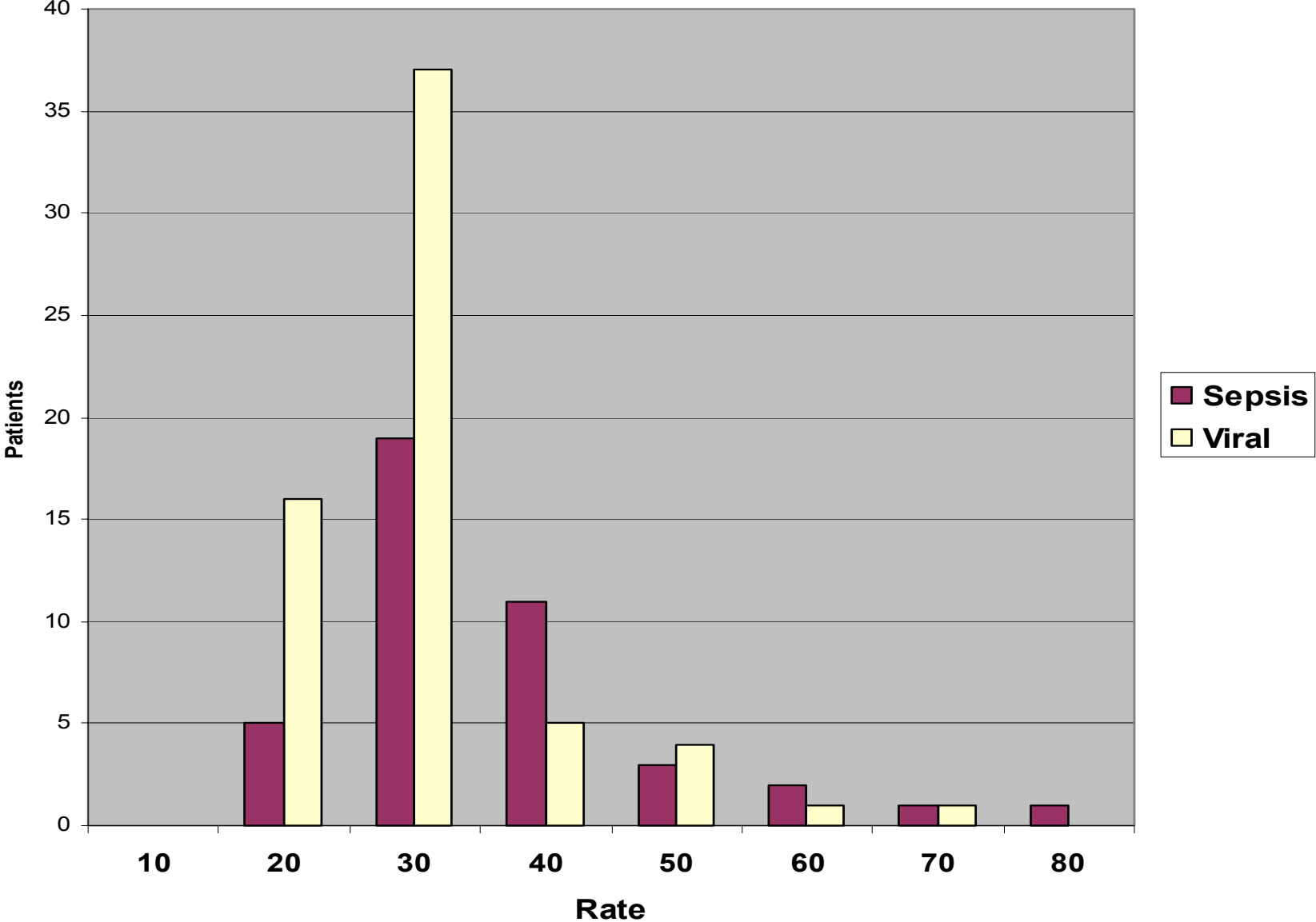
# Temp



# Pulse rate



# Resp rate



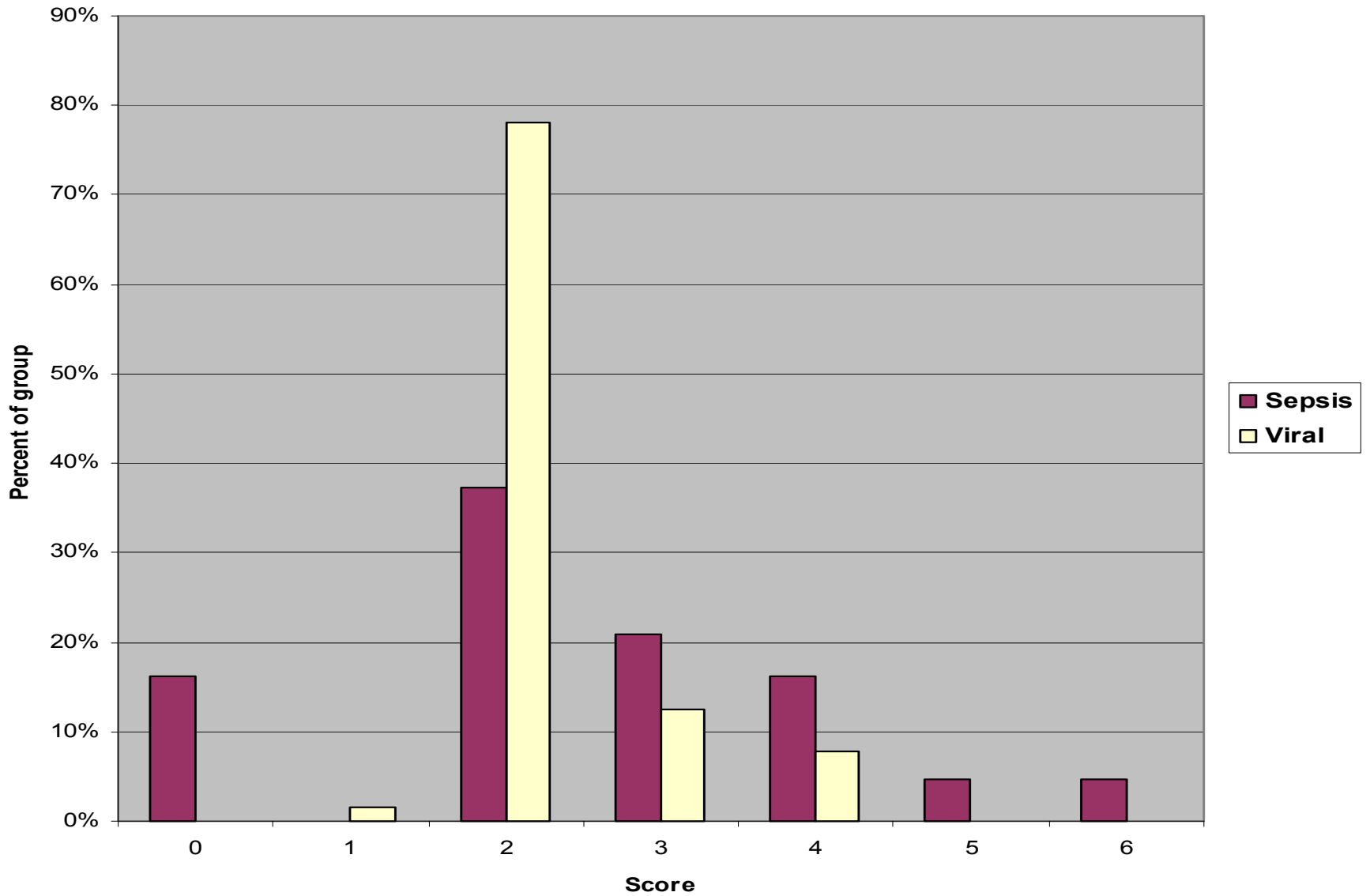
# To compare these 2 groups

- Score allocated as follows:
  
- Clinical

# Score clinical only – max =6

	0	1	2	3
<b>Response to social overture</b>		<b>Chats or smiles OR “alerts” (&lt;2mo)</b>	<b>Single words or briefly smiles OR “alerts” briefly (&lt;2mo)</b>	<b>No smile. Face anxious OR dull and expressionless or no “alertness”</b>
<b>State variation</b>		<b>If awake stays awake OR if asleep and stimulated wakes quickly</b>	<b>Eyes close briefly and then awakens OR awakens after prolonged stimulation</b>	<b>Falls asleep when examined OR will not rouse</b>

### Social&State Score ( max 6)



# Score in clusters

One point each for :

- Clinical assessment
  - Was allocated score =1 if the score for combined Social/state was  $\geq 3$

## ***And one for each VITALS***

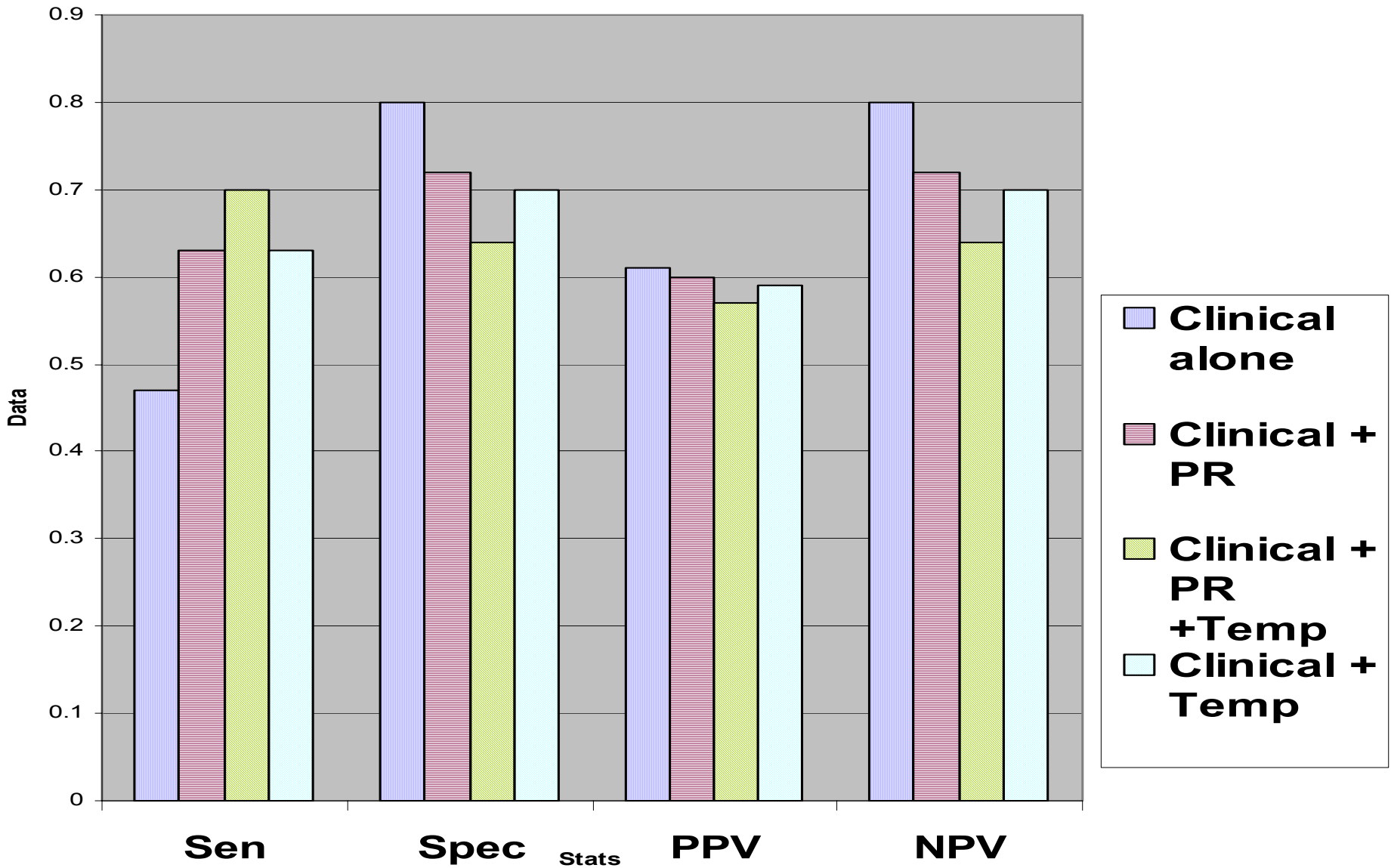
- Pulse rate  $\geq 160$  score = 1
- Resp rate  $\geq 50$  score = 1
- Temp  $\geq 39$  score =1

# Four analysis

- Clinical state alone ( gut feeling?)
- Clinical + PR
- Clinical + TPR
- Clinical + T

Viral vs Sepsis	Sen	Spec	PPV	NPV
Clinical alone	0.47	0.8	0.61	0.8
Clinical + PR	0.63	0.72	0.6	0.72
Clinical + PR +Temp	0.7	0.64	0.57	0.64
Clinical + Temp	0.63	0.7	0.59	0.7

# Clinical alone vs + Vitals



# Issues (2)

- Does assessment of vital signs (TPR =/- sats) add to the overall clinical evaluation
  - Seems yes but marginal at one snapshot
- Argument in favour is that sequential observation in any setting is needed so that recording of these vitals (may )show trajectory of the illness to next assessor

# Work in progress

- To examine more clusters / scores and different statistical analysis.
- To try to get a subset of highly likely bacterial pneumonias from the pneumonia set