

# Management of Suspected Childhood Bacterial Meningitis in a UK District General Hospital

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## Introduction

Suspected bacterial meningitis requires urgent management.

**Audit Aim:** To compare the management of suspected bacterial meningitis presenting at the Sandwell and West Birmingham NHS Trust with published NICE guidelines CG102<sup>1</sup>.

### Are children:

- Being appropriately investigated?
- Given appropriate antibiotics?
- Having appropriate follow up?

## Methods

- **Retrospective case note** based analysis.
- Children aged **>4 weeks to 16 years** coded as **meningitis** within the Sandwell & West Birmingham NHS trust between **2006 and 2011**.
- Paper notes & online data were used to collect data.

NICE Symptoms & signs	< 3 months (N=6)	3 months- 5yrs (N=19)	5-8 years (N=4)	8 -16years(N=3)
Top 3 'Common non-specific'	Fever. Irritable & unsettled. Refusing food & drink	Fever. Irritable/unsettled. Ill appearance	Fever. Vomiting/nausea. Headache	Vomiting/nausea. Headache. Fever
Top 2 'Less Common non-specific'	Sore throat/coryza. Diarrhoea/abdo pain	Sore throat/coryza. Diarrhoea/abdo pain	Sore throat/coryza.	Sore throat/coryza. Diarrhoea/abdo pain
Top 3 'More Specific'	Unusual skin colour. Bulging fontanelle. Hypotension + cold hands/feet	Stiff neck. Altered mental state. Unusual skin colour	Stiff neck. Kernig's sign positive. Back rigidity + photophobia	Non-blanching rash. Photophobia

Table 1: Age and presenting signs & symptoms of audit sample population

## Sample

- 55 notes were coded as meningitis.
- 42 notes were received.
- 34 sets fitted criteria.
- 22 patients were male.
- Age & presenting complaints are described in **table 1**.

## Audit standards & results

As per NICE guidance 100% of patients were expected to have:

### 1) Initial investigations

	% Investigations Completed (N)	% Abnormal results (N)
<b>FBC</b>	100 (33)	55 (18)
<b>Blood culture</b>	97 (32)	19 (6)
<b>CRP</b>	91 (30)	73 (22)
<b>Blood gas</b>	36 (12)	NA
<b>Coagulation screen</b>	55 (18)	28 (5)
<b>Blood glucose</b>	67 (22)	5 (1)
<b>Blood PCR (N=30)</b>	20 (6)	0

Table 2: Initial investigations performed for children with suspected bacterial meningitis.

### 2) Lumbar puncture (LP) if no contraindications

- Of 34 eligible cases, 26 were included (Exclusions= 8).
- 4 attempts failed, leaving 22 cases.
- 95% of completed LPs were abnormal.
- In 3 cases LP was performed despite contraindications.

### 3) A laboratory determined blood glucose at time of LP

- 8 had a laboratory confirmed glucose and 11 had a capillary glucose level out of a total 22 LP performed, a total of 86.3%.
- 3 cases did not have a blood glucose completed at time of LP.

### 4) Received the recommended empirical antibiotics

- NICE recommends cefotaxime ( or ceftriaxone) and amoxicillin/ampicillin for those <3 months; for those ≥3 months, ceftriaxone.
- Of those aged < 3 months (N=6), 4 received the recommended antibiotics, 2 did not receive the additional amoxicillin/ampicillin.
- All ≥3 months (N=28) received recommended empirical antibiotics.

### 5) Received antibiotics for the correct duration

- 45.2% of patients received antibiotics for the correct durations as recommended by NICE
- 83.9% received antibiotics for the correct duration when compared to local trust guidelines

Age	Confirmed/unconfirmed disease	Duration antibiotics	Organism isolated (N)
≥3 months	Confirmed	Correct	Meningococcal (3) Pneumococcal (3)
		Incorrect	Pneumococcal (2) Gram negative (1)
	Unconfirmed	Correct	Unconfirmed (6)
		Incorrect	Unconfirmed (10)
<3 months	Confirmed	Correct	Pneumococcal (1)
		Incorrect	0
	Unconfirmed	Correct	Unconfirmed (1)
		Incorrect	Unconfirmed (4)

Table 3: Breakdown of duration of antibiotics received for confirmed and unconfirmed cases of meningitis.

### 6) The correct follow up

- 87.1% of cases had documented plan for audiological follow up within 4-6 weeks of discharge.
- 77.4% of cases had a documented plan for outpatient follow up with a consultant paediatrician.
- Only 65% had evidence that this outpatient appointment occurred.

## Discussion

- This was a retrospective study, relying on adequate documentation, availability and correct coding of patient notes.
- A number of these cases were before the NICE guidelines were published so diagnosis and management may have varied accordingly.
- Clinical judgement may over ride the need for a venous gas in every child. Is a capillary blood glucose level sufficient at time of lumbar puncture?
- Parental refusal of lumbar puncture in a case of suspected meningitis causes difficult diagnosis.
- The importance of an initial separate sealed venous blood sample intended for blood PCR is a noted learning point.
- In addition to original objectives, this audit highlighted further areas for development. More accurate clinical coding is required. Liaison across departments between paediatrics and microbiology is key to ensure appropriate investigations and management.

## Conclusion

The NICE guidelines were followed in the majority of cases. There are several areas that can be developed within the department; a review of departmental guidelines is required and education for the junior staff about the NICE guidelines.