

**SPECIAL THEME – MENINGOCOCCAL DISEASE**  
**Prehospital Administration of Benzyl Penicillin by Paramedics in the UK**

Article No. 990112

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**Background**

Meningococcal infection is a rare but potential killer both in adults and in children, and one of its features is the rapidity with which it develops. There are two distinct types, though sometimes they may both be present. One is a form of meningitis (infection of the coverings of the brain), and the other is meningococcal septicaemia (infection in the bloodstream and thus throughout the body). Meningococcal refers to the type of bacteria (the meningococcus, *neisseria meningitis*) that produces the infection, not the region of the body affected.

Pursuant to the Public Health (Infectious Diseases) Regulations 1988, meningococcal septicaemia is a notifiable infectious disease within the UK.

Evidence has shown that prompt, early treatment with benzyl penicillin can reduce mortality from meningococcal infection and in November 2000, The Medicines Control Agency granted an exemption to the Prescriptions Only Medicines regulations, and paramedics in England, Scotland and Wales became the first paramedics in the world mandated to give benzyl penicillin to patients with suspected meningococcal septicaemia.

Although the speed with which this disease is identified and treated mainly determines outcome, it can be very difficult to recognise, because in the early stages it may resemble less serious viral illnesses.

As the same bacteria may also cause the more common and less dangerous meningitis, it is important for ambulance staff to differentiate between the two infections, both in terms of urgency of diagnosis and treatment provided.

In January 2003 an educational resource/aide memoir, produced in conjunction with the Joint Royal Colleges Ambulance Liaison Committee (JRCALC) and the Meningitis Research Foundation (MRF), was made available to every paramedic in the UK. <sup>(Appendix 1/2)</sup>

The Ambulance Service Association (ASA) undertook an audit of benzyl penicillin administered for Meningococcal Septicaemia during 2003.

Note that UK paramedics are not authorised to give penicillin solely for meningococcal meningitis.

The patient with septicaemia is likely to develop shock and the characteristic purpuric rash and this is how the clinical diagnosis may be made by paramedics in a prehospital setting. If the patient does not have the rash it is impossible to make the diagnosis with any certainty, although suspicions should be raised and frequent observations made as these patients may deteriorate very rapidly. A resource/aide memoir produced by the Meningitis Research

Foundation was circulated early in 2003 to raise ambulance staff awareness of this rare but potentially very serious condition and to help them (possibly the first healthcare providers-on-scene) to identify the patient at risk and treat them appropriately.

The sole indication for the pre-hospital administration of benzyl Penicillin by paramedics is the suspected diagnosis of meningococcal septicaemia, which should be identified by the presence of a non-blanching purpuric rash with a patient presenting with a history of fever, evidence of shock and diminished conscious level. (as per JRCALC Guidelines) <sup>(Appendix3)</sup>

The only absolute contra-indication is known severe penicillin anaphylaxis. Where a history of brief rashes and illness not requiring treatment following administration of penicillin is reported, the benefit from administration of penicillin will outweigh any side-effects and administration should be continued.

### **Audit**

An audit was established to determine the numbers of, and clinical appropriateness of administrations of benzyl penicillin for meningococcal septicaemia during 2003.

The audit collected data on age, gender, and compliance to the Joint Royal Colleges Ambulance Liaison Committee (JRCALC) Clinical Guidelines. No data was collected that related to the clinical outcome of patients, due to the difficulties presented by legislation related to data protection and access to patient sensitive data.

All services were asked to submit anonymised patient report forms (PRFs) to the ASA National Clinical Effectiveness Programme Manager, for all cases where benzyl penicillin had been administered. All patient identifiable data (except age and gender and incident date) were removed prior to submission for national audit.

#### Data collected from PRFs included:

- |   |                                 |
|---|---------------------------------|
| ➤ Date of administration                  | (Incident date)                 |
| ➤ Age of patient                          | (Age/Not Documented)            |
| ➤ Gender of patient                       | (Male/Female/Not Documented)    |
| ➤ Presence of non-blanching purpuric rash | (Yes/No/Not Documented)         |
| ➤ Dose administered                       | (300/600/1200mg/Not Documented) |

#### Compliance with JRCALC clinical guidelines was then assessed for:

- Benzyl Penicillin administered in the presence of a non-blanching purpuric rash  
and
- Correct dose given for age of patient

### **Analysis of Audit Data**

Of the 31 English ambulance services, 19 had introduced benzyl penicillin into local paramedic practice at the commencement of 2003.

In the twelve month period 1<sup>st</sup> January to 31<sup>st</sup> 2003, there were 74 PRFs submitted for suspected meningococcal septicaemia where benzyl penicillin was administered. Of these, 5 were analysed separately as the penicillin was administered by a general practitioner (GP).

#### GP analysis (5 cases)

Of the five cases where the benzyl penicillin was administered by a GP, there were 2 cases where no rash was present, 2 cases where a suboptimum dose was given, and one case where the rash was present and the optimum dose administered.

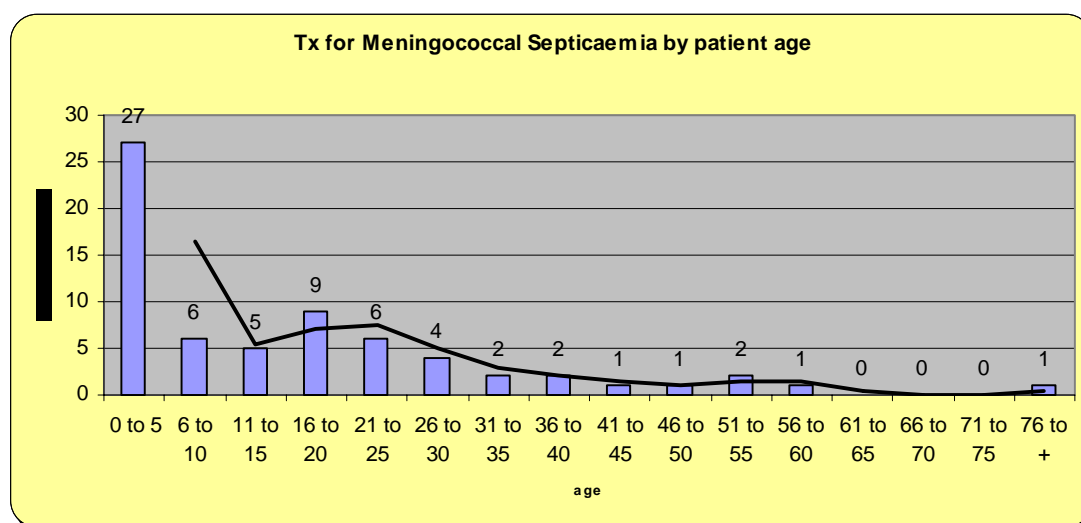
#### Paramedic Analysis

The remaining 69 cases were analysed for the final audit of paramedic administered benzyl penicillin.

#### **Cases of suspected meningococcal septicaemia by patient age (Chart 1.)**

The majority of administrations were given to small children (age 0-5years) and to young adults (age 16-21). The mean age of patients within this sample = 15. The median age = 12.

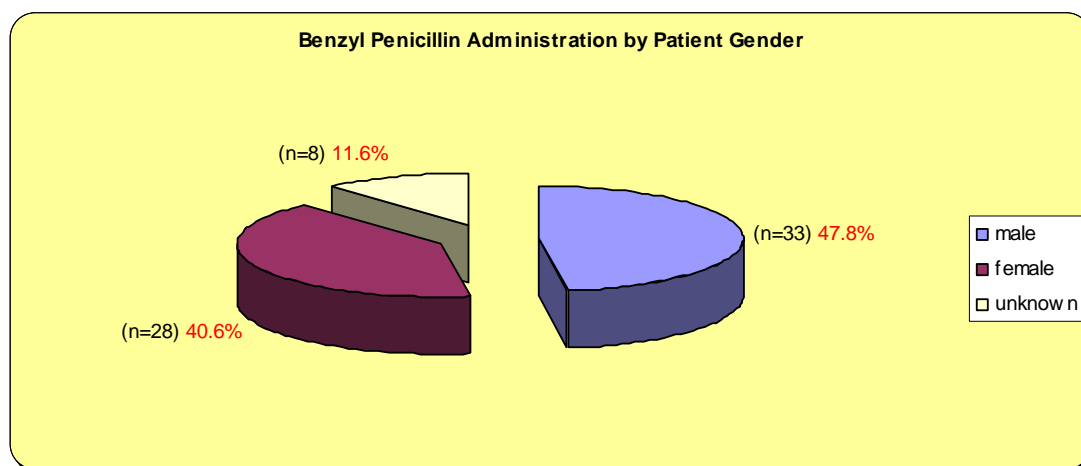
In n=2 cases the age of the patient was not documented/uncertain, however it was documented that one of these was an adult (as the next of kin was a child).



**Chart 1**

#### **Analysis of patients with suspected meningococcal septicaemia by gender (Chart 2)**

Of the 69 patients treated within the paramedic audit, there were more males (47.8%) than females (40.6%). In 8 cases (11.6%) the gender was unobtainable, either due to accidental obliteration as part of anonymisation by the submitting ambulance service, or due to failure of the paramedic to record the patient gender on the PRF.



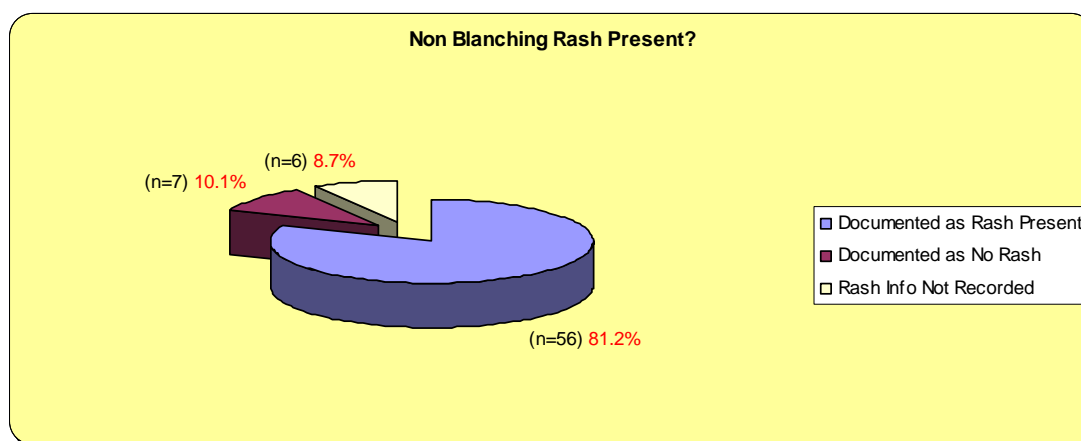
**Chart 2**

**Administration of benzyl penicillin for suspected meningococcal septicaemia in the presence of a non-blanching purpuric rash. *Chart 3.***

Of the 69 cases in this sample, benzyl penicillin was administered appropriately in n=56 (81.2%) of cases, where it was clearly documented on the PRF that a non-blanching purpuric rash was observed.

In n=7 (10.1%) of cases, it was documented that no rash was observed, but benzyl penicillin was administered. For the purposes of this audit these are considered to be inappropriate administrations.

In n=6 (8.7%) of cases, there was no documentation made by the paramedic relating to the presence/absence of a rash, but benzyl penicillin was administered. For the purposes of this audit these are considered to be inappropriate administrations.



**Chart 3**

**Compliance of Benzyl Penicillin with JRCALC Clinical Guidelines. *Chart 4.***

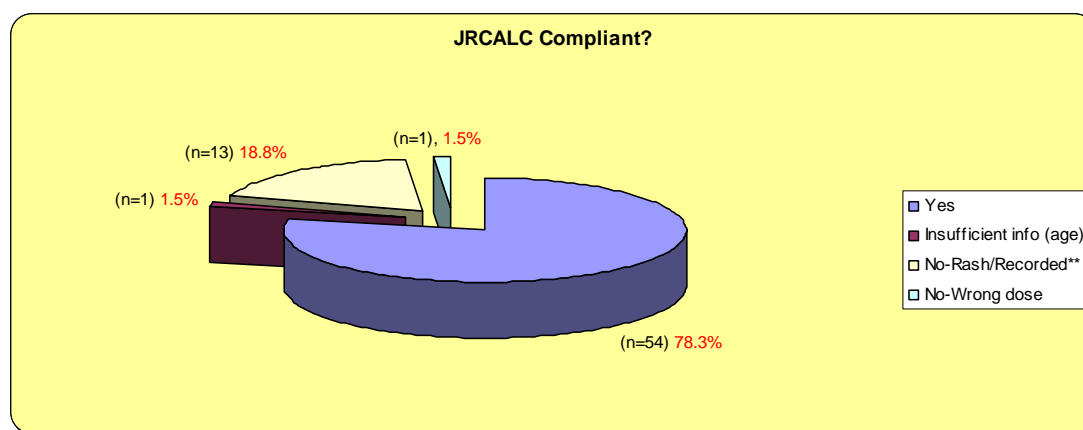
Of the 69 cases within this sample n=54 (78.3%) of administrations were considered to be in compliance with the JRCALC Clinical Guidelines.

Of the sample n=14 cases (20.3%), were considered to be non-compliant with JRCALC guidelines, either because there was no rash present or documented n=13 ((18.8%) as above),

or the wrong dose was administered n=1 (1.5%). Where the wrong dose was administered, it was a sub-optimal dose where 600mg was administered where 1200mg was the recommended dose.

\*\* There were however, explanations given as to why benzyl penicillin had been administered outside of guidelines for n=2 cases where no rash was present. One patient had a known previous history of meningococcal septicaemia where no rash presented. The remaining patient was treated at a university where earlier in the same week a student had died from meningococcal septicaemia.

Compliance with JRCALC guidelines was unknown for n=1 case (1.5%), as a result of missing data (age).



**Chart 4.**

\*\* see note above re: mitigating circumstances to operate outside guidelines.

## **Discussion**

The sample size within this audit is small (n=69) and more useable/reliable audit findings would rely on a larger sample. It would be valuable to continue this audit over a second year (2004) to effectively double the sample size.

Not all services providing benzyl penicillin submitted data so there is likely to be some level of under reporting within this audit. Whilst there is a mandatory requirement (MHRA) to audit the use of benzyl penicillin, this can be done at a local level and there is no compulsory requirement upon ambulance services to submit data into the ASA audit. All cases submitted to ASA were included in this audit.

Most compliance failures originated from one service, early in 2003, possibly before the MRF education resource was fully rolled out within the training programme. These compliance failures should reduce significantly in future audits as education progresses.

The ages of patients presenting with symptoms typical of meningococcal septicaemia in this audit mirror the national trends, with peaks amongst young children and young adults (the most common cause of transmission being linked to kissing).

Only data related to those cases identified by paramedics (sensitivity) were included in this audit. This audit was unable to collect data relating to those cases where rash was present that might have been missed by paramedics (specificity). Despite meningococcal septicaemia being a notifiable disease, due to legal restrictions related to access to patient sensitive data,

this audit could not link to national clinical outcomes of patients to provide an indication of clinical effectiveness.

In this audit, paramedic compliance with JRCALC guidelines was disappointingly low at 78.3%, however most of these compliance failures relate to poor/lack of documentation.

10.1% of compliance failures relate to cases where benzyl penicillin was administered even though it was recorded that no rash was present. It is recognised that many of these compliance failures originated from within one ambulance service before the education/aide memoire was fully rolled out. Further education and a concurrent audit should demonstrate improvements in compliance.

### **Conclusions/Recommendations**

Because the sample size of this audit is small (n=69), it is recommended that a subsequent audit is undertaken throughout 2004, and this has now commenced, with data collection underway.

This audit provides interesting information relating to the prehospital use of benzyl penicillin by paramedics. The audit does not, however, provide information reliable enough to inform clinical practice.

It is apparent that other factors are of significant contributory importance to an audit of this nature, and to undertake a more useful and informative 'clinical' audit, it would be a requirement to obtain clinical outcome data and information from public health departments relating all patients diagnosed with meningococcal septicaemia that presented with a non-blanching rash. This would provide information related to specificity as well as sensitivity, positive predictive value and negative predictive value. This would require a change of legislation similar to that which has recently been obtained for patients that suffer acute myocardial infarction or cardiac arrest.

Paramedic completion of patient report forms (PRFs) needs to be improved, which when combined with further education will lead to greater compliance to clinical guidelines. It is recommended that recirculation of existing educational materials (aide memoire) be undertaken to refresh knowledge.

No reliable information can be drawn from this audit to inform clinical practice and future audits would be reliant upon all cases of paramedic administered benzyl penicillin being submitted to the ASA audit.

### **Appendix One/Two**

Meningococcal Septicaemia education poster (aide memoire)

### **Appendix Three**

JRCALC Clinical Guidelines ~ Benzyl Penicillin

### **Author Disclosure**

The author has no financial, personal or honorary affiliations with any commercial organization directly involved or discussed in this study.

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