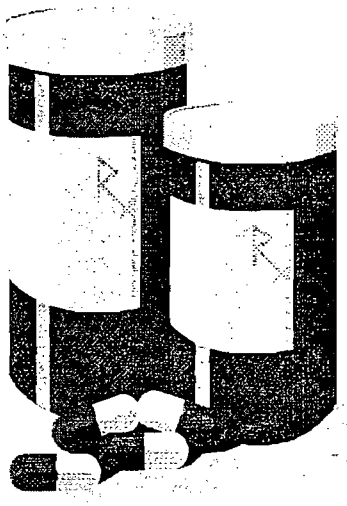
Library

Report of the Working Group on Bacterial Meningitis and Related Conditions

JANUARY 1997



FORMAT OF REPORT

1. INTRODUCTION

Bacterial meningitis and septicaemia are systemic infections caused by a variety of organisms, the most common being *Neisseria meningitidis*, *Haemophilus influenzae type* B, *(Hib)* and *Streptococcus pneumoniae*

The epidemiology of these conditions in the western world has been well described. This is particularly so in repect of the most commonly occuring of these infections in this country *meningoccal* disease[1]. This infection is spread by direct contact, can affect any age group but is concentrated mainly in infancy and early childhood, occurs mainly sporadically but occasionally in epidemic form, occurs throughout the year but peaks during the winter months, and carries a case fatality rate of up to 10%.

The most common clinical presentations are meningitis alone, septicaemia alone, and a combination of the two.

Early diagnosis and effective antibiotic treatment of cases are of paramount importance in managing the condition and the effective implementation of chemo and immunoprophylactic strategies are required to prevent its further spread.

A vaccine is available against invasive *Hib* disease and its introduction into routine childhood vaccination programmes in recent years has resulted in a significant fall in incidence of this condition to the point of eradication in some countries. Vaccines are also available against meningococcus type A and C and should be given to close contacts of cases caused by these organisms. However, as there is little immunological response in children under 18 months to the group C component and under three months to the group A component, vaccination is not recommended under these ages. There is no available vaccine effective against group meningoccal B organisms but intensive research and development work is being carried out world-wide in an effort to develop a safe and effective B vaccine and to further strengthen the effectiveness of the A & C vaccines now available. Significant progress is being reported and it is hoped that new and improved vaccines will be available for use in the next few years.

2. BACKGROUND

During 1994 and 1995, the incidence of bacterial meningitis and related conditions reported formally to the Department of Health by the health boards increased significantly over previous years.

In 1993, 203 such reports had been made, rising to 241 in 1994, and 382 in 1995. In addition, during the winters of 94/95 and 95/96 a number of deaths occurring in close temporal relationship to each other, raised public anxiety about these conditions. A somewhat similar situation had arisen in the UK where the number of cases and deaths had risen sharply and without apparent explanation during 1995.[2]

As part of its general response to this issue, the Department of Health set up a Working Group with the following members:

- Dr Jim Kiely (Chairman)
- Dr Karina Butler, (Consultant in Infectious Diseases) Our Lady's Hospital Crumlin
- Dr Mary Cafferkey, (Consultant Microbiologist) Temple Street Hospital
- Dr Jeremiah Fogarty, (Specialist in Public Health Medicine) Western Health Board
- Dr Chris McNamara, (GP Advisor) Department of Health
- Dr Darina O'Flanagan, (Specialist in Public Health Medicine) Eastern Health Board
- Dr Fiona Ryan, (Specialist in Public Health Medicine) Southern Health Board

and with the following terms of reference:

"To examine the incidence of bacterial meningitis and related conditions, and to make such recommendations as may be required to strengthen the surveillance and control of these conditions".

In considering its terms of reference, the Working Group decided that its remit could be best fulfilled by addressing the following issues:

1. Describing the epidemiology of the relevant conditions based on:

   (a) Official notifications to the Department of Health
   (b) Published statistics and communication in a variety of regionally located Communicable Diseases newsletters.
   (c) Independent research carried out and published in peer reviewed literature.

2. Elaborating a set of definitions and criteria for diagnosing these conditions which would be used uniformly around the country in the future for the surveillance of the conditions.

3. Developing a set of guidelines which would assist clinicians and public health physicians in their decisions relating to antibiotic prophylaxis and other preventive measures.

4. Recommending a system of notification and surveillance of the conditions.

5. Identifying areas requiring further research.

3. EPIDEMIOLOGY

For the purposes of notification under the Infectious Diseases Regulations (1981), health boards report the relevant conditions under "BACTERIAL MENINGITIS including MENINGOCOCCAL SEPTICAEMIA". Using this category as the indicator, in the past 10 years, the following is the reported occurrence of and mortality from this condition.

	Cases	Deaths
1985	100	25
1986	147	32
1987	111	20
1988	128	26
1989	115	16
1990	131	16
1991	154	22
1992	225	32
1993	203	22
1994	241	29
1995	382	28

This shows a significant rise in the number of reported infections in the community over this period and some variability in mortality without any significant indication of an increase in mortality.

While the figures give some broad indication of the level of reported infection, they must be treated with caution for the following reasons:

(i) The figures include all cases initially reported as this condition but make no distinction between the various causative organisms.

(ii) There is no mechanism for removing from the notified statistics, those cases in which on subsequent investigation an alternative diagnosis is made.

(iii) Initiatives in recent years have led to an increase in efficiency in reporting of cases and so any increase in reported incidence could contain a component ,of admittedly unknown size, reflecting this increased efficiency.

Examination of other sources is required to further analyse the available information.

Type of organisms:

The 382 cases reported in 1995 would have comprised mainly of *Neisseria meningitidis*, *Haemophilus influenzae* type b (Hib) and , more rarely, *Pneumococcus* and , in neonates, Group B *Streptococcus.*

Fogarty[3] examined the incidence of invasive Hib disease in Ireland between 1987-95 and discovered that subsequent to the introduction of Hib vaccine in 1992, the incidence decreased by 10 fold and in 1995 was 2.6/100,000 children less than 5 years. This represents seven cases of invasive Hib of which four were Hib meningitis and, given that streptococcal and pneumococcal infections are also rare, it is reasonable to assume that the vast majority of the 382 cases reported in 1995 were due to meningococcal infection. The remainder of this document, therefore, will focus almost entirely on *Neisseria meningitidis.*

Meningococcal Groups:

Neisseria meningitidis is divided into a number of distinct groups based on their antigenic properties , the most common of which worldwide are groups **B,C,A,Y** and **W135**. They can be further subdivided by serotype.

Fogarty[4] et al. have reported that the two commonest groups of this organism in Ireland are Group **B,** accounting for 58 % and Group **C** for 40 % of confirmed infections. In addition, the Eastern Health Board[5] in a report on meningococcal infection in 1995 identified at least sixteen strains of group **B** and ten strains of group **C** circulating in its area .

Incidence of meningoccal disease including meningitis:

For comparative purposes with other countries, only laboratory confirmed cases are used. Fogarty[4] et al. identified 241 laboratory confirmed cases in Ireland in 1995 representing a national incidence of **6.9/100,000 population.**

In its 1995[5] report, the Eastern Health Board (population 1.3 million) identified 130 laboratory confirmed cases in 1995 which represents an incidence of **10/100,000 population**.

Infoscan, a laboratory surveillance system covering the Southern , South Eastern and Mid Western Health Boards (total population 1.2 million.) describes an incidence of **6.8/100,000 population** ranging from **9.2** in the Southern Health Board to **4.8** in the Mid-Western Health Board.[6]

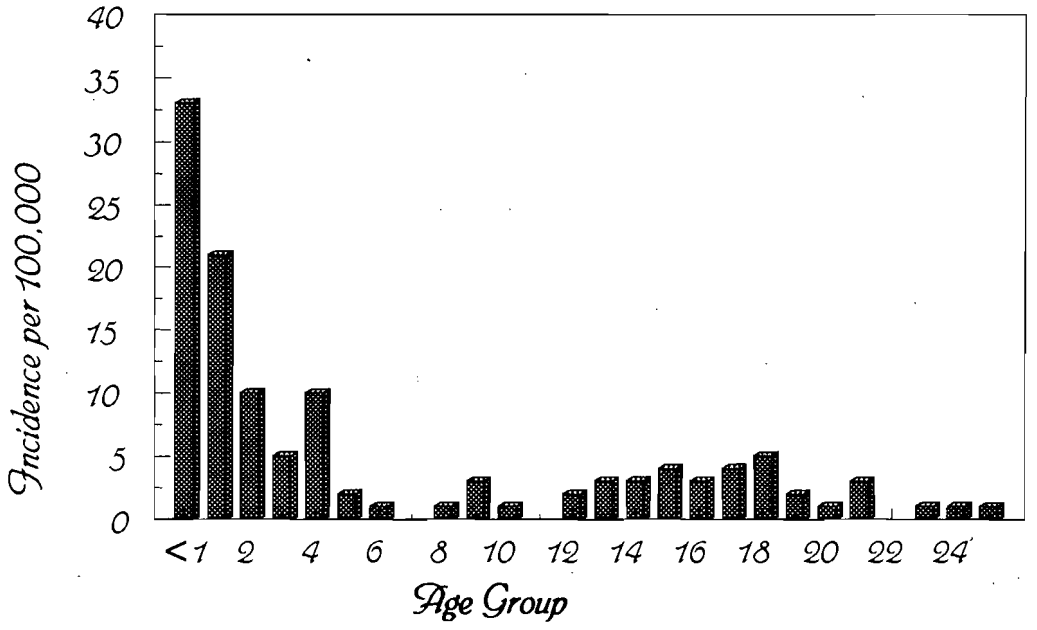
For comparative purposes, the King's College London European Meningitis Surveillance Unit reports the incidence of meningoccal disease in certain European countries in 1994 as follows:

Belgium	1.32 per 100000 population
Denmark	3.71 " " "
England / Wales	2.2 " " "
Netherlands	3.19 " " "
Scotland	2.32 " " "
Iceland	11.2 " " "
Ireland (1995)	6.8 " " "

Age specific infection:

Fogarty et al[4] reports for the country as a whole and the Eastern Health Board[5] confirms for its area that the highest age specific attack rates occur in infancy .Rates decline dramatically with age during childhood and there is a slight but noticeable increase in the 14-19 year age group. (See Fig. 1)

Fig. 1 **Age specific infection rates Eastern Health Board 1995**[5]



Conclusion

The conclusion based on the figures analysed above is that Ireland has a significant burden of morbidity and mortality from meningococcal infection, when compared to a number of our EU partners. However, as has been shown in other countries where this disease has been efficiently reported and closely monitored over many years, the occurence of Meningoccal infection is cyclical in nature. Increases in incidence may occur periodically without apparent reason, persist for a number of years and then begin to fall again towards previous lower levels. Increasing immunity in the community to infection with particular strains of organism may help to partially explain this phenomonen. Preliminary data for some parts of the country for 1996 may give some indication that such a reverse may have begun in Ireland. However , the disease will need to be closely monitored over the next few years to confirm any trend.

This analysis points also to the necessity for strengthening both the public health and laboratory surveillance of this condition so as to ensure the ready availability of the

accurate, comprehensive and timely data required to effectively monitor this disease in the community. Later recommendations reflect our concerns in this regard.

4. DIAGNOSTIC CRITERIA FOR SURVEILLANCE OF MENINGOCOCCAL INFECTION

For surveillance purposes the diagnosis of meningococcal infection shall be classified as **'Definite'**, **'Presumed'** or **'Possible'**. These diagnostic categories do not necessarily influence the clinical management of a suspected case or the decision to initiate chemoprophylaxis.

A **'Definite'** case of meningococcal infection includes children or adults who have:

- *Neisseria meningitidis* isolated from blood, CSF or other normally sterile body site (eg. blood, synovial fluid, pleural or pericardial fluid) or from a petechial or purpuric lesion.
- a positive PCR test for meningococcus obtained on blood , CSF or specimen from another sterile site.

A **'Presumed'** case of meningococcal infection includes children or adults who have:

- Gram negative intracellular diplococcus detected in CSF on microscopy.
- meningococcus isolated from an eye, throat or nasal swab and who have clinical and laboratory features of bacterial meningitis (CSF pleocytosis) in whom no other cause of meningitis is identified.
- a clinically compatible illness and who have gram negative intracellular diplococci detected in skin scrapings taken from the characteristic haemorrhagic rash.
- a clinically compatible illness with a serological response which is reported by a Reference laboratory as consistent with recent acute infection.

A **'Possible'** case of meningococcal infection includes children or adults who have:

- Evidence of acute sepsis, with or without meningitis, together with characteristic haemorrhagic purpura.

- Clinical evidence of sepsis, in whom no other cause of sepsis is identified, and in whom meningococcus is isolated from an eye, throat or nasal swab.
- Received pre-admission antibiotics, have laboratory evidence of bacterial meningitis but are culture negative.

Serological confirmation should be sought in all presumed and possible cases.

Note: All cases of suspected meningococcal infection should be reported.

LABORATORY DIAGNOSIS OF INVASIVE MENINGOCOCCAL DISEASE

1.

When invasive meningococcal disease is suspected on clinical grounds, the diagnosis should be confirmed as rapidly as possible. Accurate diagnosis is important for public health and epidemiological purposes. Isolation of *N. meningitidis* from a deep site is the "gold standard". However increasing use of pre-admission penicillin has led to a reduction in the yield from culture. In order to optimise the chances of demonstrating the organism and obtaining an isolate for sensitivity testing and typing additional specimens should be collected on admission. Non-culture methods are now being validated at the Meningococcal Investigation Laboratory (MIL) at The Children's Hospital, Temple Street, Dublin and should now form part of the routine investigation in culture negative cases.

2. Identification of putative N. meningitidis isolates and grouping, typing and subtyping of isolates.

The identification of any putative meningococci isolated from CSF, blood culture, throat swabs or skin aspirates should be confirmed. It is essential for epidemiological strain identification and public health management that isolates are grouped and typed. One relevant isolate from each case should be sent to the MIL for definitive grouping, serotyping and confirmatory antibiotic sensitivity testing.

Appendix 1 contains recommendations outlining the procedures to be adopted in the collection of specimens.

CHEMOPROPHYLAXIS

Chemoprophylaxis should be given to close contacts of confirmed or suspected cases of meningococcal disease as soon after notification of the index case as possible.

People who are close contacts of a case of meningococcal disease are at higher risk of developing disease. This risk is highest in the first seven days after a case and falls during the following weeks. The rationale for chemoprophylaxis is that it is given to eliminate carriage of the organism from the network of close contacts of the case and thereby reduce the subsequent spread of the organism to other susceptible persons. It also aims to eliminate carriage from recently colonised susceptibles in the period before invasive disease may develop.

1. Prophylaxis for the index case must be initiated prior to discharge from hospital and ideally may be given as soon as the patient can tolerate oral medication.

2. For the purpose of administering prophylaxis, close contacts are defined as those who in the 7 days prior to the onset of illness of the index case

   - shared living or sleeping accommodation with the patient ; includes babysitters/baby minders.
   - had mouth kissing contact with the patient; this does not include cheek kissing
   - gave mouth to mouth resuscitation to the patient;
   - were in the same nursery/creche as the patient; where the nature of nursery/creche contact is similar to that for household contacts; this includes adult carers

3. Chemoprophylaxis is <u>not</u> considered necessary for classmates of an index case unless there are two or more cases of the same strain in the school during the same term. However, the opportunity should be used to give advice to parents and guardians on the signs and symptoms of the disease.
   - If the cases occur in the same class, all class members and staff should receive prophylaxis.

- If the cases occur in different classes, management is more difficult but should be guided by such considerations as:

  - the interval between the cases
  - the size of the contact group
  - the carriage rate in the school
  - whether the cases are due to vaccine preventable strains
  - the degree of public concern particularly if a death has occurred.

  the incidence of the disease in the wider community

  In such situations, management should be discussed with the Specialist in Public Health Medicine with responsibility for Infectious Disease control, the Infectious Diseases Consultant and the Consultant Microbiologist in the hospital dealing with the case.

4. It is <u>not</u> recommended that prophylaxis be given routinely to passengers on public transport, eg. bus, train where an index case has been identified.

5. Special consideration should be given to the attendance of an index case at a house party in the preceding 7 days especially if pre-school children were present. If chemoprophylaxis is appropriate it should be given to all attenders both adult and children.

6. Special consideration should be given to situations in which there is greater than usual interaction between members of the extended family and an index case, particularly where overcrowding or adverse environmental living conditions exist.

7. Ideally, chemoprophylaxis should be given to all contacts as soon as possible after notification of the index case. However, it is appropriate to administer prophylaxis to close contacts, who may not have come to notice initially, up to a month after the identification of the index case as carriage may persist for a long period.

CHOICE OF PROPHYLACTIC ANTIBIOTIC

- Rifampicin is the drug of choice

- Rifampicin should be given promptly and preferably within 24 hours of diagnosis of the index case.

All close contacts should be advised that infection may occur irrespective of whether prophylaxis was administered as the contact may have been incubating disease, the antibiotic may fail to work or the contact may recolonise and develop disease. Those who show signs and symptoms of infection should receive prompt medical attention.

Dose of Rifampicin:

Children 0-12 months:	-	5 mg/Kg twice daily for two days
Children, 1-12 years:	-	10mg/Kg twice daily for two days
Children over 12 years & Adults:		600 mg twice daily for two days

Side Effects:

Rifampicin recipients should be warned about these. They are:

- interference with the contraceptive pill
- interference with anticoagulants
- red colouration of urine, sweat and tears
- permanent discolouration of soft contact lenses

Contraindications: severe liver disease

Alternative Prophylaxis: ceftriaxone as a single intramuscular dose (250mg in adults, 125 mg in children under 12 years) - see data sheet. Although not licensed for this purpose, a single dose of Ciprofloxacin 500mg orally for adults has been shown to be effective.

Pregnancy:

Close contacts who are known to be pregnant should consult their obstetrician. Options following counselling should include giving no prophylaxis, giving ceftriaxone, or taking a throat swab and giving ceftriaxone if meningococcus is cultured. While no drug can be regarded as absolutely safe in pregnancy, harmful effects on the foetus have not been documented in relation to either of these drugs.

Vaccination:

If the strain is vaccine-preventable, ie. **A,C,Y** or **W-135**, vaccination should be offered to these contacts who are given prophylaxis and can be of benefit up to three months after the diagnosis of the index case. Vaccination is not generally recommended for contacts of group **C** disease under 18 months as there is little immunological response in children of this age. Stocks of these vaccines should be kept available.

There is, at present, no available safe and effective vaccine against group **B** organisms.

5. TREATMENT OF MENINGOCCAL INFECTIONS:

1. Primary Care

In view of the high mortality rate from meningococcal infection and the often rapid deterioration of the patient prior to hospital admission, early treatment of suspected cases of the condition with benzylpenicillin may be life saving and it is recommended that GPs carry supplies of this drug in an emergency bag.

Recommended Dosage of Benzlypenicillin:

Adults and children > 10 years	1200 mgs
Children 1-9 years	600 mgs
Children < 1 year	300 mgs

This, ideally, should be given intravenously ; it can be given by the intramuscular route in shocked patients but is not as effective.

If there is a history of penicillin anaphylaxis (which is extremely rare, of the order of 0.002% of exposed patients), chloramphenicol may be given by injection in a dosage of 1.2g for adults and 25mg/kg for children under 12 years.

2. Hospital

Each hospital A/E Department should have a protocol for the clinical management of acute meningococcal infection displayed in an accessible place to be used by all doctors dealing with such cases. This protocol should also emphasise the necessity of reporting the case.

It is recommended that the relevant Faculties in the Royal College of Physicians of Ireland be requested to devise such a protocol so as to achieve the widest possible acceptability.

6. REPORTING & SURVEILLANCE:

1. A case of confirmed or suspected meningococcal infection must be reported to the local Health Board by the doctor who diagnoses or suspects it.

2. Cases should be reported to an identified health board medical officer whose name and telephone number are immediately accessible to the reporting doctors.

3. On receiving the notification, the health board should institute immediate appropriate preventive measures.

4. Health boards should continue to notify the Department of Health within 24 hours of a case occurring in addition to the routine weekly returns. Suggested reporting forms are included in Appendix 2.

5. The identification of any putative meningococci isolated from CSF, blood culture, throat swabs or skin aspirates should be confirmed. Non-culture methods are now being validated at the Meningococcal Investigation Laboratory (MIL) in the Children's Hospital, Temple Street and all isolates and specimens for non-culture diagnosis should be sent there.

6. It is essential from the viewpoint of epidemiology and public health surveillance that isolates are grouped and typed and the results reported to the health board. The development of close working relationships between Public Health Departments, Infectious Disease Consultants and Hospital Microbiologists is a prerequisite for success in this area.

7. On an annual basis, the health boards are required to review the notifications received and exclude those notifications which finally prove not to be actual cases of meningococcal disease as defined or those which were reported more than once.

8. The availability of health board medical staff out of normal working hours is very variable around the country and may militate against the effective management of this disease in the community. This should be reviewed as a matter of urgency.

9. The Meningococcal Investigation Laboratory in the Children's Hospital Temple Street, Dublin is designated as a National Centre for laboratory investigation of this condition.

7. RESEARCH

There are many areas in the clinical , laboratory and epidemiological aspects of this condition which would prove fruitful subjects for research. The following are of particular importance:

(i) The identification of particular sub-groups within the population who may be at particular risk of contracting this condition.

(ii) Clarification as to whether there may be genetic susceptibility to infection with the organisms causing this disease.

(iii) The early management of the acute condition both at primary care and hospital level.

(iv) Follow up of surviving children who have been infected to determine the nature and frequency of long term sequelae.

(v) Audit of general practitioner treatment of the condition.

In the course of its deliberations, the Working Group was made aware of the availability of resources for research purposes through the Meningitis Research Foundation and this potential source of support should be pursued.

8. COST IMPLICATIONS

1. The major elements of this report are procedural and carry little or no costs.

2. The acceptance of the case definition and the implementation of the prophylaxis and prevention guidelines have no costs.

3. The designation of Temple Street Meningococcal Investigation Laboratory as a national centre for serological investigation carries little cost. The capital cost has already been met through the Hospital Equipment Programme

4. The notification system changes are procedural in nature and carry no costs.

5. The initiation of research on the areas recommended would have cost implications. However, funds are available through the voluntary sector and the Health Research Board and these options would be pursued.

9. RECOMMENDATIONS

1. Public awareness of meningococcal infection should continue to be raised by a combination of public information campaigns by the health services and by support of voluntary bodies engaged in this area.

2. Continuing medical education for General Practitioners, Hospital A & E doctors and Paediatricians should give particular emphasis to the diagnosis and management of this condition. Written protocols should be available in all hospitals and GPs should always carry benzylpenicillin in their emergency bags.

3. The diagnostic criteria for the surveillance of this condition should be used uniformly by all health boards.

4. The chemoprophylaxis guidelines should be used by all health boards and hospitals as the basis for their approach to the prevention of spread of infection

5. The proposals for notification should be implemented.

6. All putative cases of meningococcal infection should have full laboratory investigation and the Meningococcal Investigation Laboratory in Temple St Hospital should be designated as a national centre for serological investigation of culture negative cases.

7. Support should be given to research in the areas identified in this report.

8. The implementation of these recommendations should be evaluated in one year with particular reference to such matters as the availability of comprehensive national epidemiological information and the utilisation of standardised protocols.

10. SUMMARY

1. In the past five years, cases of BACTERIAL MENINGITIS including MENINGOCOCCAL SEPTICAEMIA reported to the Department of Health have increased three fold from 131 in 1990 to 382 in 1995. There was an increase of 50% between 1994 and 1995 from 241 to 382.

2. The routinely reported statistics do not provide the quality of information to accurately describe the epidemiology of these infections in Ireland.

3. Analysis of other sources of information such as Regional Laboratory Surveillance reports and peer reviewed articles confirms that Ireland has a significant burden of morbidity from meningococcal infection with a laboratory confirmed incidence of 6.9 /100,000 of the population. There is some variability in incidence between health board areas.

4. This incidence in Ireland compares to a rate of less than 3/100,000 in the UK and just over 11/100,000 in Iceland.

5. To provide support and assistance in the future surveillance and management of this condition, this report sets out:

   (a) A set of diagnostic criteria to be used in defining a case of meningococcal infection to be used for surveillance purposes.

   (b) Procedures to be used in making a laboratory diagnosis.

   (c) A set of guidelines to assist public health physicians in the decision making process relating to chemoprophylaxis and prevention.

(d) Suggestions concerning the primary care and hospital treatment of suspected cases.

6. Recommendations are made concerning the system of notification and surveillance.

7. Suggestions are made concerning important areas for research.

8. Should these recommendations be acceptable, arrangements should be made quickly to disseminate the various guidelines through the health boards to the relevant health professionals with a view to having them in use as soon as possible.

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APPENDIX 1

A. Specimen Collection

The following specimens should be collected routinely on admission. Specimens for non-culture methods of diagnosis [Polymerase Chain Reaction (PCR) and serology] may be stored at -20°C pending results of culture.

1. Blood for culture

Blood cultures should always be taken regardless of pre-admission antibiotic administration.

2. Blood for non-culture diagnosis by PCR

Blood for PCR must be collected **on admission** as following antibiotic treatment the specimen will rapidly revert to negative. Ideally a 2.5 to 5.0 mls EDTA sample should be obtained (minimum 0.5 ml) This should be stored frozen at -20°C pending the results of culture. If cultures are negative the specimen should be sent to the MIL. Meningococcal DNA is liable to autolyse if left unprocessed for more than 48-72 hours therefore delays in despatching the specimen should be minimised. Specimens do not require refrigeration during transport to the MIL.

3. Cerebrospinal Fluid (CSF) for Microscopy and Culture and PCR

CSF should be collected unless a lumbar puncture is contraindicated. CSF microscopy and culture may be positive even when pre-admission penicillin has been given. If cultures are negative, part of the remaining specimen should be submitted to the MIL for PCR examination. This CSF specimen should not have been centrifuged and should be sent to the MIL in a small and well sealed container such as a screw-capped Eppendorf centrifuge tube.

4. Throat swab and/or Pernasal Nasopharyngeal swab

In order to optimise the chances of obtaining an isolate for antibiotic sensitivity testing, grouping and typing, a throat swab (a full sweep of the pharyngeal wall and

tonsils) should be taken in all patient. If it is not possible to take a sweep swab, (for example in an infant or an unco-operative patient) a pernasal swab rotated on the posterior pharyngeal wall is an appropriate alternative. Fluffy charcoal impregnated swabs are preferred and should be placed immediately in transport medium (eg. "Transwab") and submitted to the local laboratory without delay for "culture ? *N. meningitidis*". These swabs should be cultured on a selective medium such as blood agar with polymyxin and vancomycin, or modified New York City medium. These swabs must be processed urgently in the laboratory.

Consideration may be given to the taking of throat swabs from family members prior to administration of prophylaxis with a view to identifying the causative organism particularly when the index case is under 5 years old. To prevent any possible feelings of guilt , it should be clearly explained that the intention is simply to identify the strain causing the illness.

NB: ***N. meningitidis is frequently carried asymptomatically in the nasopharynx and the significance of a positive nasopharyngeal or throat culture must always be assessed in the light of clinical and other laboratory findings.***

5. Skin Scrapings and Culture of Aspirate from Rash

Skin Scrapings: In a patient with a petechial or haemorrhagic rash, skin scrapings should be taken using the following method: *Obtain glass microscopic slides with frosted ends and plastic slide holders. Wearing latex gloves, pinch a skin lesion between index finger and thumb in order to exude circulating blood. "Pick" the surface of the lesions using a sterile scalpel. Apply more pressure to express a drop of tissue fluid and blood; this is spotted directly onto a glass slide by pressing the slide against the lesion - several small smears of 3-4mm in diameter are better than one large one. The process should be repeated with a second skin lesion. Label the frosted end of the slides in pencil with patient's name. Place the slides in the slide holder and send to the laboratory for staining. In the laboratory the smears should be fixed with methanol and stained. For optimal differentiation of polymorph nuclei, Wright's stain or dilute Giemsa (one part of stock to 50 parts of buffer at pH*

7.2) are preferred to the Gram stain. The organisms stain blue and intracellular organisms only should be reported.

Needle Aspiration: Needle aspiration of a skin lesion may be performed as follows: *Aspiration may be performed using a needle and syringe containing 1-2 ml. sterile saline. The needle should be inserted into the centre of a petechial lesion at an angle almost parallel to the skin followed by gentle up and down movement of the bevel of the syringe. The aspirate should be injected aseptically into a blood culture bottle, clearly labelled and submitted for culture.*

6. Viral Culture

In cases where viral infection is suspected, a throat swab in viral transport medium and a faeces sample should be sent to an appropriate laboratory for viral culture.If possible, an aliquot of CSF should also be sent for Viral culture and/or Enteroviral PCR.

7. Blood for Serology

Paired acute and convalescent sera (clotted samples each at least 0.5mls) should be collected where possible in culture negative cases. The acute phase sample should be collected within 48 hours of admission. The convalescent phase sample should ideally be collected 14 to 21 days after presentation. These paired specimens should be sent to the MIL for testing for IgG and IgM antibody against meningococcal outer membrane proteins.

Specimens for non-culture Diagnosis of Invasive Meningococcal Disease

Test	Specimen Required	Comments
Blood for PCR	**EDTA Sample,** Minimum in infants and young children : **0.5 - 1.3 mls** Older children and Adults : **2.5 - 5.0 mls**	This specimen must be collected on admission as antibiotic treatment rapidly causes this specimen to revert to negative.
CSF for PCR	A small aliquot of the neat CSF specimen :- minimum 100 µl 8/10 drops.	Store and transport in a small well sealed container, eg. an Eppendorf tube
Paired samples for serology	clotted blood samples	*Acute phase:* collect within 48 hours of admission *Convalescent Phase:* Ideally collect at day 14-21

APPENDIX 2

Confidential Fax to
Dr J Kiely, CMO Office, Dept of Health
Fax number 01-6710148

Initial Notification to the Department of Health
Suspected Case of Meningococcal Disease or Bacterial Meningitis

Name:_____ Age :_____

Address : _____

_____

_____

Community Care Area : _____

Health Board : _____

Disease suspected or confirmed : _____

_____

_____

Admission Date : _____

Hospital : _____

Clinical condition : _____

_____

_____

Comments : _____

_____

_____

Notifying doctor : _____ Date : _____

Confidential Report to
Dr J Kiely, CMO Office, Dept of Health

Follow-up Notification to the Department of Health
Case of Meningococcal Disease or Bacterial Meningitis

Name:_____ Age :_____

Address : _____

_____

_____

Community Care Area : _____

Health Board : _____

Disease suspected or confirmed : _____

_____

_____

Admission Date : _____

Hospital : _____

Clinical condition : _____

_____

_____

Comments : _____

_____

_____

Notifying doctor : _____ Date : _____