

Meningococcus this winter: what was going on?

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ABSTRACT: There was a time in the not very distant past when meningococcus was not being recognised locally. While laboratory sensitivity used to isolate *Neisseria meningitidis* has not changed in Malta, the frequency of its detection has increased, more so in the last few months. In this discussion, it is assumed that the sensitivity of detection and degree of reporting of the condition has remained stable throughout the past eleven year period, so that the observed trend remains interpretable. Early, aggressive treatment with antimicrobials makes subsequent microbiological ascertainment difficult. Although meningococcal disease is notifiable by law, it is assumed that reporting of the recognised condition may not be full.

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Introduction

Although meningococcal disease is notifiable by law¹, it is assumed that reporting of the recognised condition may not be full. In countries like Malta where meningococcal meningitis is usually sporadic, no epidemic threshold is defined, and disease is assumed to reach epidemic proportions when²:

1. occurrence **increases three to fourfold** compared to previous years
2. incidence of **meningitis cases doubles** from one week to the next for 3 consecutive weeks
3. frequency **in over 5 year olds** rises as a proportion of all cases

While laboratory sensitivity used to isolate *Neisseria meningitidis* has not changed in Malta³, the frequency of its detection has increased, more so in the last few months. For the period October 1995-March 1996, eight confirmed cases were registered, as against none for the corresponding period of the previous season (October 1994-March 1995). With an expected yearly incidence of 1.91 (SD 1.22), it was evident that 7 cases of meningococcal disease in the first three months of 1996 was abnormal.

Table 1 presents a simple time series for yearly incidence of verified disease episodes from 1985⁴. Averaging the incidence of bacterial meningitis (total) for 1985-95 gives an expected occurrence of 0.09 cases per week. If one were to consider the period 7-27

March 1996, the actual occurrence for each 7-day period would be as in Table 2.

Table 2 - Weekly incidence of meningitis, Malta, 7-27 March 1996.

Period March, 1996	Incident cases (bacterial meningitis)
Days 7 - 13	0
Days 14 - 20	1
Days 21 - 27	5

While it is established that the highest age-specific attack rates of invasive disease occur in infants⁵, none of the 7 cases for Feb-Apr 1996 were infants (age range 2-26y, average age 13.7 years). This shift in age predilection has characterised reported outbreaks elsewhere⁶. Furthermore, two of these patients grew serogroup C organisms, while the same serogroup could not be excluded in the other 5. Another serogroup C case (F, 5 months) occurred with onset 7 December 1995. As current knowledge indicates that epidemics are clonal⁷, the last case noted till end-April (onset 23 April) could not have been linked to the others, having been due to *Neisseria meningitidis* serogroup B.

These indices suggest that the cases occurring in March were related in time and possibly in place (the whole of densely-populated Malta). A definite common link by person could not be established between any two

Table 1 - Yearly crude incidence of meningococcal disease (meningitis &/or septicaemia), Malta, 1985 - Apr 1996.

Year	85	86	87	88	89	90	91	92	93	94	95	96 to Apr
<i>N meningitidis</i> disease	2	0	1	2	2	2	0	3	2	3	4	7

of the cases, but given the ease and extent of human mobility countrywide this cannot be easily excluded.

What has changed?

N meningitidis is transmitted by respiratory droplets and does not survive long outside the human body. At any one time, some 10% of the general population may be nasopharyngeal carriers, mostly having non-virulent strains. Carriage is higher in young adults, in smokers and in overcrowded settings. While carriage may last 9 months, invasion develops within a week of acquisition (incubation 2-10 days)⁸.

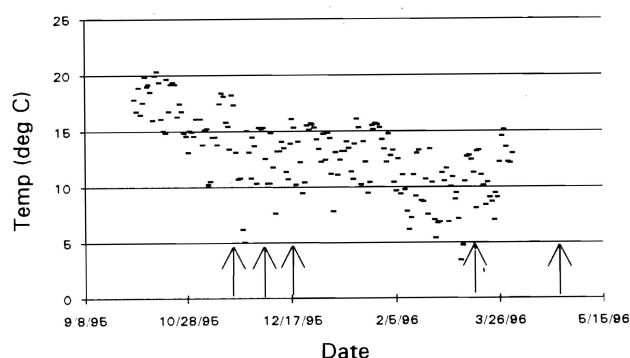
Predisposing factors to invasive disease include:

Host factors: age, immunity status, respiratory tract infections

Agent factors: virulence

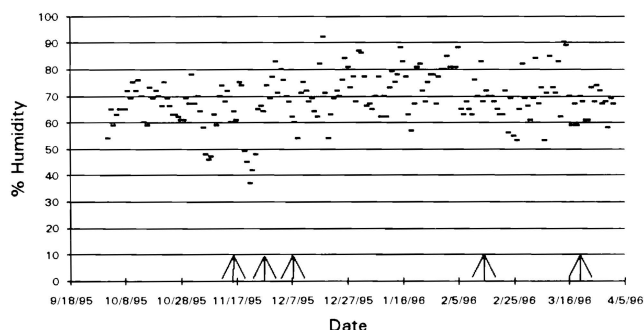
Environmental factors: dryness, dust, cold

There has been anecdotal evidence of successive waves of URTIs this winter in Malta. Influenza type A activity has been documented at the start of 1996⁹. There is also evidence of another flu-like outbreak in late February this year¹⁰. These infections may have predisposed subjects to subsequent invasive-type illness with *N. meningitidis*. Climatic conditions may also



Source: Meteorological Office, Luqa, April 1996

Fig 1. - Ambient temperature, Malta Minimum Temperatures, period Oct 95-Mar 96.



Source: Met Office, Luqa, April 1996

Fig. 2 - Relative humidities, Malta Minimum Humidity, period Oct 95-Mar 96.

have favoured epidemic transmission. An epidemic of meningococcal meningitis (serogroup A) was raging concurrently in the African meningitis belt, causing 38,000 cases and 5,000 deaths¹¹. Fig. 1 and Fig. 2 depict the local variations in minimal relative humidity and ambient temperatures for the period of interest. Dips in temperature and humidity coincide with clustering of reported illness (as indicated on the x-axis). Table 3 shows the demographic and microbiological characteristics of the cases for the period November 1995 to April 1996. The distribution by residence indicates countrywide involvement.

Table 3 - Bacterial meningitis, Malta (Nov 95 - Apr 96)*

Sex	Age	Residence	Onset	Isolate
M	16y	B'kara	16/11/95	GrpB
F	20y	Zurrieq	26/11/95	Not typed
F	5m	Zabbar	07/12/95	GrpC
F	5y	St Julians	16/02/96	Not typed
M	19y	St Julians	20/03/96	Not typed
F	6w	Fgura	21/03/96	G-ve rods
F	21y	Mellieha	21/03/96	Not typed
F	2y	Kirkop	21/03/96	GrpC
M	26y	Rabat	26/03/96	Bact men
M	16y	Swieqi	27/03/96	Bact men
F	2y	Marsa	29/03/96	GrpC
M	21y	Mtarfa	15/04/96	G-ve cocci
F	26y	Zurrieq	23/04/96	Grp B

* excludes 1 case of *Haemophilus influenzae* b meningitis in a F 18mo, onset 4 Jan 1996.

Action indicated

The mainstay of preventive action is identifying significant contacts, administering prophylactic antimicrobials and making them and their carers aware of the need to get early medical attention on suggestive symptoms.

1. Chemoprophylaxis

Chemoprophylaxis is given to eliminate carriage, and hence reduce the risk of invasive disease in close contacts. It should be taken as soon as possible after diagnosis of the index case.

The subjects for whom it is indicated are:⁵

- Index case/s, unless having eradicated dosage of ceftriaxone
- Household contacts: anyone living in the index household during the 7 days before onset of illness. Family members of the index case are at a higher risk of developing disease than the general community (kindred genetic susceptibility and increased exposure), risk being highest in the first 7 days following infection. The type of contact indicating treatment is one close and prolonged, like persons sleeping in the same house, boy/girlfriends and childminders in homes.

It is therefore not indicated routinely following cheek kissing, or for health care workers unless they have been involved in mouth-to-mouth resuscitation, or handling infected secretions directly. During the management of the recent episodes of disease, ciprofloxacin has been

used for non-pregnant females, and should conceivably improve patient adherence given the stat dosage. Rifampicin is being reserved for the young, and used as sparingly as possible given concerns about development of microbial resistance to the agent. A total of 235 (av 33.6; range 5-69/case) contacts were prescribed prophylactic antibiotics by the Disease Surveillance Branch in connexion with the seven cases of meningococcal disease this year. An unestablished number of others (eg hospital staff, secondary contacts) had similar medication of their own accord or through their GP. Most of this would not have been justified but reflects a tendency to panic.

2. Vaccines

There are two meningococcal vaccines on the market, Bivalent (A+C) and Quadrivalent (A,C,Y,W135). Antibodies form within 7-10 days after single-dose administration, and protection lasts for about 3 years. The local policy up to now (currently being revised) has been to vaccinate only persons travelling to areas with habitual epidemics (eg African meningitis belt)¹². Immunisation is now being considered as an adjunct to chemoprophylaxis to avert extension, or help control an epidemic. In epidemic situations, early serogroup characterisation becomes important as a mass-vaccination campaign may halt an epidemic due to a vaccine-sensitive strain within a few weeks².

3. Information

It is useful for contacts exposed, their carers and medical practitioners to maintain a high index of suspicion for early symptomatology and signs of meningococcal disease. An ad hoc leaflet in Maltese has been developed by the Department of Public Health, and is handed out to persons prescribed chemoprophylaxis. Physicians have been alerted to the increased occurrence of meningococcal disease through a joint clinical-public health meeting at the University of Malta Medical School (24 April), and a Departmental circular to GPs in Health Centres, Malta & Gozo (26 April)¹³.

Conclusions

An increased occurrence of meningococcal disease was observed during last autumn and winter in persons

resident in Malta. This article describes the pattern of disease and established contributory factors. Evidence presented suggests that occurrence of invasive meningococcal disease bordered on the epidemic proportion last season. Of a cluster of 4 cases with onset between 20 March and 15 April, two were confirmed as serogroup C while the same serogroup could not be excluded in the others.

Ambient conditions around the dates of maximal incidence may have been favourable for development of invasive disease (dips in relative humidity and minimal temperature). Influenza activity, which is known to predispose to meningococcal invasion, was also verified this winter.

While the role of the weather-man in an early warning alert system stands to be defined, the case is made for closer cooperation between clinical, public health and hospital infection control sectors in this country to ensure implementation of timely measures to avert preventable extension of infection, and serious sequelae of the disease.

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