Table 1: Meningococcal Carriage Studies within the Military

Country/ Date	Population	Swab Type	Carriage Rate	Serogroup (of isolates tested)	Comments
India[1] 2015	• Military recruits • n=360 • Age 16-25y	T & NP	*Initial*: 11.94% *3m:* 12.77% *6m:* 15.0%	Initial A: 72.09%, NG 27.91% Acquired A: 81.2%, NG 18.2%	• Progressive rise in carriage rate • None of the isolates were antibiotic resistant • 6.9% acquired carrier status
Finland[2] July 2004-Jan 2006	• Male Military recruits, • serogroup ACYW135 polysaccharide vaccinated • n=892 • Age 18-24.4y; median 19.6y • Service time 6, 9 or 12 months	OP	21.6%	B :74.3%, Y 24.3%, W135: 0.3%	• Carriage rate higher at the end of military service than arrival (18.0 v 2.2%) • Most carriage isolates associated with ST-60cc (28.0%), ST-41/44cc (21.5%), ST-23cc (11.7%), other clonal complexes identified (ST-254,ST-35, ST-178)
Malaysia[3] June 2005	• Army recruits • n=3195 • Age 17-24y • 11.3% female	T & N	37.0%	A: 3.33%, W-135: 4.8%% X, Y or Z 81.4%	• 100 isolates tested for antibiotic sensistivity • 85% resistant to cotrimoxazole • 12.5% resistant to penicillin • All susceptible to chloramphenicol, rifampicin, cefotaxime & levofloxacin
Iran[4] March 2002-July 2003	• Military training recruits • Median/mode age 19.4/19y • n=764 (initial; 5-8th day of entrance) • n=692 (1.2-2 months; end of training) • Not vaccinated	TonP	*Initial:* 11.4% *Final:* 33.0%	A: 17.7%, B:26.6%, C: 13.3% A+B 6.6% A+B+C 15.5% NG 20%	• Carriage rate non-smoker 28% • Carriage rate smoker/passive smoker 38%
Germany[5] Nov 1999-March 2000	• Military recruits • n=1179 • Age 18-26y • Sampled within 2w of arrival	RetroP	32.6%	B: 42%, C: 10%, W-135 4% Y:12%, NG: 15%	• Rapid increase in carriage rate with age • Low prevalence of hyperinvasive meningococci
Poland[6] Spring 1998 & Autumn-Winter 1998/99	• Male polish recruits • Age 19-21y • Surveyed at entrance and during first 2 months of service • n=151 (Spring) • n=168 (Autumn-Winter)	P	*Spring* Entry: 16% 2 months: 36% *Autumn/Winter* Entry: 24% 2 months: 61%	NG: 53%, B: 32% Other strains (A, C,X,Y & Z)	• Predominant phenotype NG:21:P1.7 • Analysis of strains showed that phenotypes predominating in carriers were significantly different than those found in patients with invasive disease
UK[7] Jan1994-May 1995	• Male Royal Marine commando recruits in groups of 30-40 • n=311 • studied during 29 week training • no vaccination prior to training	NP	*Entry*: 37.9% (range 27.5-53.8%)	NG: 33%, B :25%, Y: 15% X:8.5%, W-135: 7.5% Z: 6.5%, C: 3.0%, H 1.5%	• Active & passive smoking associated with carriage rate on entry • Carriage rates increased during training (37.9% to 56.8%) • 66% of recruits initially negative acquired a meningococcus

Israel[8] April 1993- March 1994	• Israel Defense Force- personnel being discharged after compulsory military service (men 3y; women 20 months) • n=1632; 912 (56%) male, 702 (44%) female • Mean age 22.0y & 20.2y, men & women respectively	T	15.9%	B: 76.2%, Y: 12.7%, C: 1.5% A: 0.8%, Other: 0.4%, NG: 8.4%	• Carriage higher in males v females (19.1 v 11.9%) • Men in closed base carriage 24.1% • Carriage associated with <12 years school education, smoking, service at a closed base
Denmark[9] Nov 1992- July 1993	• Male military recruits of the Royal Life Guard • n=1069	P	39-49%	B: 31.8%, C: 6.5%, NG: 44.2%	• Individual carriage status changed over the three month period
Greece[10] July 1990	• Military recruits • n=993	T	25.0%	ND	• Camp A: carriage 30%; Camp B: carriage 18% • Camp B: significantly higher proportion of recruits who were non-secretors of glycoprotein from their ABO blood group antigens, heavy smokers and younger <19y • Carriage associated with smoking • Increased carriage rate (40%) in recruits with recent viral infection
UK[11] Feb1986	Personnel at a Royal Navy Air Station n=2479	T	23.0%	B: 36.5%, C: 8.9%, A; 0.35% NG: 52.1%	• Civilian carriage 16.5% v naval personnel 26.5% • Carriage higher in males v females (23.6 v 18.3%) • Carriage decreased with age e.g., <20y: 40.5%; 25-29y: 23.2%, 40-44 12.1%
USA[12] 1977	• Marines • Time in service ranges from 4 months to 11 years (mean 2.7y, median 2.0y) • n=414	NP	64.5%	NG 42.2% <u>Of groupable</u> B: 22.3%, Y:25.7%, W-135: 24.3%, 29E: 23.0%, C: 4.7%	• Used PAGE patterns for strain classification
USA[13] Jan1970	• Marine Corps trainees • n=1635	NP	65.1%	C: 32.6%, Y: 11.5% B: 9.3%, Other: 11.3%	• Carriage reduced from 65.1%, before 600mg rifampin daily for 4 days, to 10.1% 4 days after treatment • Control group- reduction not observed • 73.5% of strains isolated after 4d of treatment were resistant to rifampin, this was not the case in strains isolated before treatment or in control population • After the initial reduction in carriage 4days after treatment, carriage increased rapidly
Norway[14] April 1969	• Naval recruits • n=837	T	Initial 43.3% 5 weeks later 51.4%	B 53.2% (most frequent)	• Rise in carriage rate with time • Variation depending on home region of recruits • Sulphonamide resistance detected
USA[15] Jan 1965- March, 1965	• Military training centre for air force recruits • n=583	NP	Initial 15.4% Six weeks 9.7%	A 0.9%, C: 2.6% B: 68.3%, NT: 28.3%	• Decrease in carriage rate • 15% GroupB strains resistant to sulfadiazine

NG: non-groupable, NP: nasopharyngeal, NT: non-typeable, OP: oropharyngeal, P: pharyngeal, RetroP: Retropharyngeal, T: throat, TonP: tonsil pharyngeal

Table 1: Meningococcal Carriage Studies within the Military- References

1. Jha D, Thakkar HK, Kumar R. Follow up study of meningococcal carriers amongst recruits of a military training center. *J Commun Dis* 2015;47:8-12.

2. Jounio U, Saukkoriipi A, Bratcher HB, et al. Genotypic and phenotypic characterization of carriage and invasive disease isolates of *Neisseria meningitidis* in Finland. *J Clin Microbiol* 2012;50:264-73.

3. Rohani MY, Ahmad Afkhar F, Amir MA, et al. Serogroups and antibiotic susceptibility patterns of *Neisseria meningitidis* isolated from army recruits in a training camp. *Malays J Pathol* 2007;29:91-4.

4. Eslami-Nejad Z, Esmaili M, Saiid-Adeli N, et al. *Neisseria meningitidis* carrier rate among military recruits in Kerman, South-East of Iran. *Arch Iranian Med* 2005; 8:304–10.

5. Claus H, Maiden MC, Wilson DJ, et al. Genetic analysis of meningococci carried by children and young adults. *J Infect Dis* 2005;191:1263-71.

6. Tyski S, Grzybowska W, Dulny G, et al. Phenotypical and genotypical characterization of *Neisseria meningitidis* carrier strains isolated from Polish recruits in 1998. *Eur J Clin Microbiol Infect Dis* 2001;20:350-3.

7. Riordan T, Cartwright K, Andrews N, et al. Acquisition and carriage of meningococci in marine commando recruits. *Epidemiol Infect* 1998;121:495-505.

8. Block C, Gdalevich M, Buber R, et al. Factors associated with pharyngeal carriage of *Neisseria meningitidis* among Israel Defense Force personnel at the end of their compulsory service. *Epidemiol Infect* 1999;122:51-7.

9. Andersen J, Berthelsen L, Bech Jensen B, et al. Dynamics of the meningococcal carrier state and characteristics of the carrier strains: a longitudinal study within three cohorts of military recruits. *Epidemiol Infect* 1998;12:85-94.

10. Blackwell CC, Tzanakaki G, Kremastinou J, et al. Factors affecting carriage of *Neisseria meningitidis* among Greek military recruits. *Epidemiol Infect* 1992;108:441-8.

11. Pether JV, Lightfoot NF, Scott RJ, et al. Carriage of *Neisseria meningitidis*: investigations in a military establishment. *Epidemiol Infect* 1988;101:21-42.

12. Craven DE, Frasch CE, Mocca LF, et al. Rapid serogroup identification of *Neisseria meningitidis* by using antiserum agar: Prevalence of serotypes in a disease-free military population. *J Clin Microbiol* 1979;10:302-7.

13. Beam WE Jr, Newberg NR, Devine LF, et al. The effect of rifampin on the nasopharyngeal carriage of *Neisseria meningitidis* in a military population. *J Infect Dis* 1971;124:39-46.

14. Holten E, Vaage L. Carriers of meningococci among Norwegian naval recruits. *Scand J Infect Dis* 1971;3(2):135-40.

15. Farrell DG, Dahl EV. Nasopharyngeal carriers of *Neisseria meningitidis*. Studies among air force recruits. *JAMA* 1966;198:1189-92.

Table 2: Outbreaks of Meningococcal Disease in the Military (1963-2011)

Outbreak	Summary
Korea[1] **April 2011** **n=3** Male Military recruits (19-21y)	**Clinical** profile: 1/3 meningitis, 1/3 septicaemia & meningitis, 1/3 no definite septicaemia or meningitis **Case fatality rate**:33.3%, 1 patient septicaemia & meningitis died **Causative agent**: *N. meningitidis* Group W-135, novel sequence type-8912 (W-135:P1.5-1,2-2:F3-9:ST8912) **Control measures:** • As of November 2012 quadrivalent (A/C/W/W-135, Menveco©) meningococcal vaccination would be given to all recruits in basic military training
Warsaw, Poland[2] **January 2007** **n=15** Soldiers from a military base	**Clinical:** profile-15 invasive meningococcal disease **Case fatality:** rate-13.3%, 2 patients died from meningococcal septicaemia **Causative agent:** *N. meningitidis* Group C, ST-11/ET-37 **Control measures:** • all soldiers of sub-unit received prophylactic ciprofloxacin (500mg) • all military base personnel and patients admitted were vaccinated with meningococcal polysaccharide vaccine, groups A,C
Skwierzyna, Lubuskie, Poland[3] **22-24 March 2006** **n=4** Newly recruited soldiers living for 14 day in an army barracks	**Clinical profile:** 3/4 meningococcal septicaemia,1/4 meningitis, all survived **Causative agent:** *N. meningitidis* Group C, ST-11/ET-37 **Control measures:** • affected army sub-unit was quarantined from 24 March-4 April • all soldiers of sub-unit (n=250) received prophylactic ciprofloxacin (500mg) • after confirmation of strain all residents of unit received prophylaxis (n=1300) • restriction of movement of soldiers between 21 March-4 April • All staff in ICU unit given prophylactic rifampicin
Kashmir India[4] **01 Feb-26 May 2006** **n=17** ındian soldiers deployed under field conditions in counter insurgency operations in Kashmir	**Clinical profile:** 14/17 meningitis, all survived; 3/17 **Case fatality rate**: 11.76% (2 meningococcal septicaemia) **Risk factors**: Overcrowding in trainee accommodation, poor ventilation, close contact due to lack of heating **Distribution of cases**: 15/17 young trained soldiers (21-26y), focal outbreak (6 cases from adjacent barracks), 11 sporadic cases. **Control measures:** • rifampicin chemoprophylaxis (600mg, bd) of contacts and medical surveillance • non-availability of vaccine at time but recommended • associated barracks cleaned with 2.5% cresol, fumigated, ventilated • addressed overcrowding situation of beds
Greece[5] **January 1996** **n=10** Hellenic Air Force recruit centre, southern Greece	**Clinical profile:** meningococcal sepsis (1/10), meningitis (6/10), meningitis & arthritis (2/10), meningitis & myocarditis (1/10); all survived, 1 had hearing impairment & 1 had peroneal nerve paralysis **Causative agent:** *N. meningitidis* Group C **Control measures:** • rifampicin chemoprophylaxis
Israel[6] **Jan 1992 (No.1) n=3** **Jan 1992 (No. 2) n=3** **Feb 1992 (No.3) n=2** Israel Defence Force	**Clinical profile:** No. 1: 2/3 meningitis & 1/3 meningococcemia; No. 2: 2/2 meningitis, No. 3: 1/ 3meningitis & meningococcemia, 2/3 meningitis **Causative agent** :*N. meningitidis* Group C; Outbreak No. 3 rifampicin resistant (2/3) **Control measures**: • rifampicin chemoprophylaxis (600mg, bd)
UK[7] **1988** Royal Air force Recruits	**Causative agent:** *N. meningitidis* Group C type P1,2 **Control measures**: • polysaccharide vaccination, until carriage rate fell from <19% to <1%
Norway[8] **September 1981** **n=3** Military Camp	**Clinical profile:** 3 cases of meningococcal disease; 1/3 septicaemia (died) **Causative agent:** *N. meningitidis* Group B type 15
USA[9] **1977** **n=88** Air Force Recruits	**Clinical profile:** 68/88 meningococcal pneumonia, 10/88 meningococcemia, 6/88 meningitis **Causative agent:** *N. meningitidis* Group Y **Case fatality rate:** 0.01% (patient with known pre-existing leukopenia)

USA[10] **1974** **n=13** Army Training Centre	**Clinical profile:** 4/13 meningococcemia, 1/13 meningococcemia & meningoencephalitis, 3/13 primary meningococcal pneumonia **Causative agent**: *N. meningitidis* Group Y **Case fatality rate:**23.0% (patients with meningococcemia)
India, Hyderabad, Andhra Pradesh [11] **1968-69** **n=25** Military training centre	**Case fatality rate:** 4.3%
USA[12] **1964** **93 military personnel;** **10 civilian dependents** **1963** **59 military personnel** **5 civilian dependents** **1962** **36 military personnel** **2 civilian dependents** Mostly Combat Trainees, within the first 8w of training, but also civilian dependents of military personnel, Fort Ord, Monterey County, USA	**Case fatality rate:** 1962- 0%, 1963- 8.2%, 1964- 13.3% 1964-12/89 meningitis cases (military), 2/10 meningitis (dependents) 1963- 5/56 meningitis cases (military), 0/5 meningitis cases (dependents) 1962- no deaths **Causative agent:** *N. meningitidis* Groups B (90%) & C, 50% resistant to sulfadiazine **Control measures:** • 1962 sulphadiazine chemoprophylaxis; from June 1963 only if organism was sensitive • suspension of new basic combat trainees and army reserve personnel • limit visitors to trainees • leave & passes cancelled during 8w training • trainees not allowed to leave their company area, all services to be brought to them • classes divided to have an empty chair between each man • additional barracks to provide an interval of use between cohorts • reduction in the number of new trainees in the September & October cohorts • close surveillance of recruits showing symptoms • physical activities lightened • maintain good living conditions and clean barracks, kitchens & limit intermixing
USA[13] **Spring 1963** **n=18** Recruit companies in The San Diego Naval Training Center, USA	**Case fatality rate :** 22.2% (4/18) **Causative agent:** *N. meningitidis* Groups B & C, some isolates resistant to sulfadiazine sulphonamide **Control measures:** • sulfadiazine tablets administered to 12,000 recruits who were then placed in quarantine • closed to new arrivals after an interval of four weeks, training was resumed • contact between men already aboard and men arriving was prevented • crowding was also minimized

Table 2: Outbreaks of Meningococcal Disease in the Military (1963-2011)- References

1. Jo YM, Bae SM, Kang YH. Cluster of serogroup W-135 meningococcal disease in 3 military recruits. *J Korean Med Sci* 2015;30:662-5.

2. Kadlubowski M, Wasko I, Klarowicz A, et al. Invasive meningococcal disease at a military base in Warsaw, January 2007. *Euro Surveill* 2007;12(9):pii=3147.

3. Grecki M, Bienias M. Outbreak of invasive meningococcal disease among soldiers in Skwierzyna, Poland, March 2006. *Euro Surveill* 2006;11(27):pii=2996.

4. Kushwaha AS, Aggarwal SK, Arora MM. Outbreak of Meningococcal Infection amongst Soldiers Deployed in Operations. *Med J Armed Forces India* 2010;66:4-8.

5. Makras P, Alexiou-Daniel S, Antoniadis A, et al. Outbreak of meningococcal disease after an influenza B epidemic at a Hellenic Air Force recruit training center. *Clin Infect Dis* 2001;33:e48-50.

6. Almog R, Block C, Gdalevich M, et al. First recorded outbreaks of meningococcal disease in the Israel Defence Force: three clusters due to serogroup C and the emergence of resistance to rifampicin. *Infection* 1994;22:69-71.

7. Masterton RG, Youngs ER, Wardle JC, et al. Control of an outbreak of group C meningococcal meningitis with a polysaccharide vaccine. *J Infect* 1988;17:177-82.

8. Kristiansen BE, Sørensen B, Bjorvatn B, et al. An outbreak of group B meningococcal disease: tracing the causative strain of *Neisseria meningitidis* by DNA fingerprinting. *J Clin Microbiol* 1986;23:764-7.

9. Koppes GM, Ellenbogen C, Gebhart RJ. Group Y meningococcal disease in United States Air Force recruits. *Am J Med* 1977;62:661-6.

10. Smilack JD. Group-y meningococcal disease. Twelve cases at an army training center. *Ann Intern Med* 1974;81:740-5.

11. Bhalla IP, Dutta SB, Kuppuswamy G. Meningococcal meningitis in a military training centre in Hyderabad. *J Assoc Physicians India* 1972;20:177-82.

12. Brown JW, Condit PK. Meningococcal infections, Fort Ord and California. Calif Med. 1965;102:171-80.

13. Millar JW, Siess EE, Feldman HA, et al. In Vivo and In Vitro Resistance to Sulfadiazine in Strains of *Neisseria meningitidis. JAMA* 1963;186:139-41.

Table 3: Recent case studies published relating to meningococcal infection in the military

Military details	Date	Sex	Age (y)	Serogroup	Diagnosis	Outcome
Korean military trainee, 5th week of training, diagnosed with Complement 7 Deficiency[1]	2012	M	20	W-135	Meningitis & Septicaemia	Survived
USA- 3 weeks into Advanced Individual Training[2]	2011	M	19	C	Septicaemia	Died
USA non-commissioned army officer, combat veteran, 3rd week of training for deployment to Iraq; 4y post basic training[87]	2011	M	26	B	Septicaemia	Died
USA Air Force non-commissioned officer; in Iraq, in theatre for 2 months, >10y since basic training[2]	2011	F	37	B	Septicaemia	Died
USA, Service Academy student, 4 months post training[2]	2011	M	20	Y	Septicaemia	Died
Turkish Soldier recruit[3]	2010	M	22	X	Meningitis	Survived
Turkish Recruits[4]	2006	M	20	W-135	Meningitis	Unknown
Turkish Recruits[4]	2006	M	21	W-135	Meningitis	Unknown
US Marine Corps recruit, MPSV-4,1 month previously [5]	2005	M	18	C	Septicaemia	Died
US Marine Corps recruit on active duty MPSV-4, previously[5]	2005	F	22	B	Meningitis & Septicaemia	Survived
US Marine Corps, in 3rd week of training[5]	2005	M	32	NG	Pneumonia	Died (concomitant adenovirus *& H. influenzae*)
Taiwan Military trainee[6]	2001	M	Unknown	B	Meningitis	Died
Korean Army[7]	2001	M	19-22	UD	Septicaemia	Survived
Korean Army[7]	2001	M	19-22	UD	Septicaemia	Died, 15 h after purpura
Korean Army[7]	2001	M	19-22	UD	Septicaemia	Survived, skin necrosis
Korean Army[7]	2001	M	19-22	N/D	Meningitis	Survived
Korean Army[7]	2001	M	19-22	N/D	Meningitis & Septicaemia	Survived
Korean Army[7]	2001	M	19-22	UD	Meningitis & Septicaemia	Survived, right deltoid dysfunction
Korean Army[7]	2001	M	19-22	C	Septicaemia	Survived
Korean Army[7]	2001	M	19-22	UD	Meningitis	Survived
Korean Army[7]	2001	M	19-22	C	Meningitis	Survived, frontal lobe dysfuntion
Korean Army[7]	2000	M	19-22	C	Septicaemia	Died, 8h after purpura
Korean Army[7]	2000	M	19-22	UD	Septicaemia	Survived, skin grafts on lower limbs
Korean Army[7]	2000	M	19-22	A	Meningitis	Survived

N/D: not done, UD: undetermined by PCR but not serogroup B

1. Sim SH, Heo JY, Kim EC, et al. A case of meningococcal sepsis and meningitis with complement 7 deficiency in a military trainee. *Infect Chemother* 2013;45:94-8.

2. Keiser PB, Hamilton L, Broderick M. U.S. military fatalities due to Neisseria meningitidis: case reports and historical perspective. *Mil Med* 2011;176:308-11.

3. Kiliç A, Bedir O, Basustaoglu AC, et al. *Neisseria meningitidis* serogroup X sequence type 767 in Turkey. *J Clin Microbiol* 2010;48:4340-1.

4. Kilic A, Jolley KA, Gul HC, et al. Genetic and antigenic characterization of *Neisseria meningitidis* strains from Turkish recruits in 2006. *Intern Med* 2008;47:1949-50.

5. Crum NF; Chapman FA; Russell KL, et al. The Many Faces of Meningococcal Disease: A Case Series and Review of Presentations and Treatment Options. *Infectious Diseases in Clinical Practice* 2005;13:5-9.

6. Lai YC. An Epidemiological Investigation of a Suspected Meningococcal meningitis Outbreak at a Military Camp. *Taiwan Epidemiology Bulletin* 2002;18: 2002-01-25.

7. Lee SO, Ryu SH, Park SJ, et al. Meningococcal disease in the republic of Korea army: incidence and serogroups determined by PCR. *J Korean Med Sci* 2003;18:163-6.

Table 4: Diagnosis, Treatment and Management of Meningococcal disease [1,2]

Diagnosis	Treatment	Control & Prevention
Samples • Blood & CSF • Swab of posterior nasopharyngeal wall *(may be useful in case of negative cultures)* **Biochemical/ Haematological** **Blood**- • glucose, lactate, procalcitonin • FBC, urea, creatine, electrolytes, liver function tests, clotting screen *(leucocytosis, anaemia, thrombocytopenia)* **CSF**- • glucose, lactate, protein, cell count **Microbiological** • Blood culture, prior to antibiotics or if given in community as soon as possible on arrival at hospital (≤1h) • Growth optimal at 35-37^{o}C in 5%CO_2 on blood or chocolate blood agar • CSF microscopy, culture, latex agglutination of bacterial polysaccharides, antibiotic sensitivities • Latex agglutination for identification of capsular groups A, B, C, W & Y from culture • Positive Kovac's oxidase test & carbohydrate utilization tests • Gram negative diplococci • Antibiotic susceptibility testing (chemoprophylaxis: rifampicin & quinolones, clinical treatment: penicillin & ceftriazone, chloraminophenicol if others not available **Other tests** (although no international consensus) • PCR of peripheral blood-EDTA sample/CSF (16S rDNA, *ctrA, porA, crgA, sodC, cnl*) • Dipstick diagnostic tests (capsular groups A, C, W, Y & X)	**Adult** **In the community** • If signs of meningococcal disease e.g. a rash in combination with signs of meningism or severe sepsis • Benzylpenicillin 1200mg IM or IV, or a third generation cephalosporin such as Cefotaxime (2g) or Ceftriaxone (2g) IM or IV • In the case of known anaphylaxis to penicillins or cephalosporins, antibiotics should not be given until admission to hospital **Confirmed diagnosis** **Antibiotic Treatment** • 2g ceftriaxone IV, 12 hourly or • 2g cefotaxime IV, 6 hourly or • 2.4g benzylpenicillin IV, 4 hourly (alternative) or • chloramphenicol 25mg/kg, 6 hourly (anaphylaxis) • If not treated with ceftriaxone, a single dose of 500mg ciprofloxaxin orally should also be given • Treatment of patients with confirmed meningitis who have recovered by day 5, treatment can be stopped **Adjunctive Treatment** • In cases of suspected meningitis dexamethasone 10mg IV, 6 hourly should be given on admission, before or simultaneously with antibiotics • if antibiotics have already been commenced 10 mg IV dexamethasone every 6 h should still be initiated, up until 12 h after the first dose of antibiotics **Supportive Care** • Intravenous fluid, vasopressors, oxygen, intubation (as required)	***All close contacts of probable or confirmed meningococcal meningitis*** Ciprofloxacin • -500mg stat (adult) • -250mg stat (child 5–12y) • -30 mg/kg up to a maximum of 25 mg stat (child< 5y) Rifampicin Alternative for those unable to take Ciprofloxacin • 600 mg bd for 2 days (child>12y) • 10 mg/kg bd for 2 days (child 1–12y) • 5 mg/kg bd for 2 days (child <12 months) Vaccination • any unvaccinated contacts of cases caused by any non-B serogroup • If 2 or more cases of serogroup B disease occur within the same family vaccination against serogroup B should be offered to all household contacts ***In addition to prophylaxis to contacts the following should also be offered to the index case***: • Any unimmunised index case under the age of 25y (whatever the capsular serogroup) should be offered vaccination according to the national schedule • Cases of confirmed serogroup C disease who are eligible for vaccination and have previously been immunised with Meningococcal C conjugate (or polysaccharide) vaccines should be offered a booster dose of Meningococcal C conjugate vaccine on discharge from hospital • If two or more cases of probable/confirmed IMD* due to the same vaccine preventable strain in the same educational or residential setting within a four week period occur then wider vaccination may be offered in line with national guidance

*IMD=invasive meningococcal disease

1. Vázquez JA, Taha MK, Findlow J, et al. Global Meningococcal Initiative: guidelines for diagnosis and confirmation of invasive meningococcal disease. Epidemiol Infect Online First: June 30 2016. doi:10.1017/S0950268816001308

2. McGill F, Heyderman RS, Michael BD, et al. The UK joint specialist societies' guideline on the diagnosis and management of acute meningitis and meningococcal sepsis in immunocompetent adults. J Infec 2016;72:405-38.