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Treatment of Bubonic Plague

Communicating to all Local Boards & Munl: Councils, the Munl: Commrs of Madras, the Surgeon-General and the Sanitary Commr copy of remarks on the ____ by Mr James Cantlie M.B.

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Government {1897} of Madras.

LOCAL AND MUNICIPAL.

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G.O., No. 298 M., 26th February 1897.

FEBRUARY.

Treatment of Bubonic Plague.

Communicating to all Local Boards and Municipal Councils, the Municipal Commissioners of Madras, the Surgeon-General and the Sanitary Commissioner, copy of remarks on the — by Mr. James Cantlie, M.B.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

READ—the following paper:—

Remarks on the treatment of Bubonic Plague, by JAMES CANTLIE, M.B. ABERD., F.R.C.S. ENG., Lecturer on Applied Anatomy at Charing Cross Hospital Medical School; late of Hong Kong.

At first sight it would seem as though the treatment of plague was a subject which it is useless to discuss, as it is repeatedly stated that we have no cure for plague. We have no "cure" for many—nay, most—of our diseases; yet experience has shown that although no specific treatment is known, still with care, judicious nursing and medical supervision, ailments, such as typhoid, cholera and zymotic diseases generally, can be, and are, conducted to a successful termination. Much, therefore, as it is desirable to know what will "cure" the disease, it is not consistent with our behaviour in other illnesses to stand by and wait until it is discovered what form of attenuated virus may be tried as a specific remedy.

Once for all let it be understood that in no disease does one get such immediate results from careful and prompt medical treatment, and as a direct outcome of watchful nursing, as in plague; and perhaps one ought to add to that, "in the case of Europeans."

Natives, whether of China or India, succumb more readily to plague than Europeans. There are one or two reasons for this: (1) A native seldom comes to a doctor (a European doctor most of all) until the disease is well advanced. (2) In point of stamina the poorer natives are a long way below northern Europeans. (3) The inherited dislike of the native for all forms of stimulants, be they medicinal or alcoholic, during illness. (4) The belief of the natives in the old adage that "to starve a fever" is correct. The difference between Europeans and natives was well illustrated, during the 1894 epidemic in Hong Kong, by the fact that, out of 11 British patients, 9 recovered—a mortality of only 18·2 per cent.—whilst the Chinese died at the rate of something like 95 per cent. This favourable result cannot, however, be ascribed altogether to racial influence; it was rather due to the effect that medical treatment and good nursing had upon the course of the disease. The British patients were seen early in the disease. They could take, and stand, stimulants, medicinal and alcoholic, well, and the result was the satisfactory number of recoveries which took place. Even with such Asiatics as would submit to similar treatment, most markedly in the case of the Japanese doctors, were the satisfactory results of treatment during plague manifest.

The attendance of the doctor must be prompt, and his treatment must be decisive. In fact, during the first five days of illness in plague the doctor must be within a few minutes' call. To each ward of a hospital a doctor should be assigned, or, if a valuable life is at stake in a private house, medical aid must be obtainable in a few seconds. The changes are so rapid in plague, the features of the disease so fulminant, that without immediate treatment being possible success is hopeless.

NURSING.

In a hospital ward, during the first five days of illness, practically two patients require an attendant to themselves if the utmost good possible is to be done. A nurse must never let her patient out of sight for a moment, be the patient asleep or awake. She cannot leave the ward or room, without posting a deputy, for any purpose whatever. No nurse should be on duty for more than eight hours at a time; still better is it to follow the four hours' "watches" kept at sea.

The number of nurses required may seem outrageous, but we have in many illnesses a day and night nurse for private patients, and no more is demanded in this the most fatal illness known. Of course, plague comes in epidemics, and the number

of nurses is limited, no doubt; but we must not lose sight of what is necessary in considering what is expedient. Shortly, it may be put that a liberal supply of doctors and nurses is essential if the lives of the plague-stricken, be they native or European, are to be saved.

Enough has been said as to the rapidity of the onset, the development, and the fatality of plague, to make the importance of early treatment in the disease and of the requisite promptness in its administration understood. The symptoms and signs change so rapidly, and in such varying succession, that no stereotyped line of treatment can be followed. Now it is delirium which calls for relief, now cardiac distress, or vomiting may supervene; or an unexpected loss of pulse, or a collapse totally without warning, may carry off the patient before any help is obtainable. The much despised legend "Treat symptoms as they arise" is the maxim in plague, and if the word "promptly" were added, the summary of plague treatment is before us. The disease is caused by a bacillus, the toxic effects of which upon the blood give rise to functional derangements of possibly all organs, but most markedly of the nervous system, central and peripheral. The poison is so acute that, with the exception of the glandular inflammation, but little structural change is met with in the more vital organs. The cardiac trouble which is so marked an accompaniment of the disease is evidently a functional one and the result of derangement of the nervous supply of the heart. This has constantly to be borne in mind when the subject of drugs is dealt with.

The subject of segregation, temporary hospitals, quarantine, and disinfection generally, are not dealt with here. I propose merely to deal with general and medicinal treatment.

GENERAL TREATMENT.

The essentials are of free ventilation, a cool room (60° to 70° F. where such is possible), a plentiful supply of hot and cold water, ice, a sufficiency of servants, and, of course, all the appliances of a modern hospital. Deaths are so frequent and so sudden that when the hospital is large it is necessary to have men employed whose duty it is to remove, to disinfect and to dispose of the dead.

Nothing should be allowed to leave the ward but to be disinfected. Crockery and glass should be scalded. Fæces should be sprinkled with quicklime; bed and bedding if not burnt are to be disinfected by heat; the steam disinfector is well nigh essential. Scrupulous cleanliness of the floor and bedsteads, obtained by washing with a disinfectant solution, are of primary importance, and all doorways should be curtained by a sheet wet with carbolic acid, Jeyes', or other reliable antiseptic.

The patient should not be allowed to get out of bed for any purpose, but the use of the bedpan and urine bottle should be insisted on. So many times has it occurred that the patient has tumbled over dead whilst getting up to stool, &c., that this is an imperative measure to insist upon.

MEDICINAL TREATMENT.

Purgation.—When the patient is first seen, the foul state of the tongue, the foul breath, the jaundiced tinge of the conjunctivæ, and a generally bilious aspect, suggests a purge. For this purpose, calomel in 5-grain to 10-grain doses recommends itself. This is to be followed by a saline in some five hours' time. Against this treatment it may be argued that the drain upon the system and the lowering action of calomel are deleterious, but, if given quite early in the disease and not when the pulse is flagging, it undoubtedly seems to do good. It frequently stops vomiting, which is often present; it clears away the jaundiced aspect, it restores the power of taking nourishment, and it seems to diminish mental aberration and cardiac distress. If a full gall-bladder justifies the exhibition of calomel, *post-mortem* evidence of that condition is not wanting. So far as is known, bacilli of plague escape from the body in greatest numbers by the bowel. In the breath, sweat or urine, bacilli are but sparsely met with, but in the fæces a rich supply is found. This points to the necessity of ample disinfection as being requisite for all latrines, bedpans, closets, &c., but it also proclaims as justifiable and rational the attempt to assist nature in expelling the poison of plague by a free action of the bowels.

Stimulation.—From the very first onset, or certainly after twenty-four or forty-eight hours, it will be found necessary to stimulate the plague patient by food, by alcohol, or by medicine.

Food.—Unless the patient is actually delirious, there is not usually much difficulty in feeding plague patients. In fact, in comparison with allied ailments, appetite is wonderfully good. One encourages this in a general way, but the occurrence of sudden death supervening after the ingestion of a full bowl of rice, for example, and its accompaniments, in the case of Chinese patients on several occasions, leads one to the belief that a full meal is not without its danger. The heart is in such a condition that it takes but little to disconcert its rhythm, and the pressure consequent upon a full stomach is calculated to do this. Food should be in small quantities frequently repeated and of a kind which is easily digested. Brand's essence of beef, in fluid or jelly form, is excellent, but any beef jelly will do. Ox-tail soup, mutton broth, beef and chicken tea should be constantly on hand to suit the varying palate of the patient. Conjee water—that is, the water in which rice is boiled—is useful as a drink and serves as nourishment. Milk with ice (sipped slowly) and ice cream (Lowson) are particularly grateful.

Drink.—Thirst is at times a marked symptom, and its relief should be attended to by allowing the patient anything in reason. Ice to suck, if not kept up too long; water or lemon and water (not lemonade) to drink, if not in such quantity as to distend the stomach; beer and stout iced, especially for Europeans, is "at once stimulant, soporific, nutritious and thirst-quenching" (Lowson). Brandy or whisky diluted with not more than three or four times its quantity of water (not aërated waters) should be freely supplied. When the pulse shows signs of failing or collapse or faintness supervene, then, of course, alcohol is doubly beneficial, and brandy is preferable to whisky as a cardiac stimulant.

Delirium.—When active the delirium of plague is best combated by cold to the head. Leiter's coil would be perhaps the readiest method, provided the patient could be kept still, but an ice-bag or a constantly-wetted cloth is efficient. These applications combined with tepid sponging of the body at frequent intervals seem grateful to the patient, are useful means of reducing temperature, and seem the safest and readiest method of quietening active delirium.

Hyoscine.—In most cases, but not in all, hyoscine administered hypodermically in doses of gr. $\frac{1}{100}$ is perhaps the most efficient and safe of the hypnotics. It calms the nervous system and induces sleep when everything else fails. Hyoscine should be one of the first drugs in the armamentarium of a plague hospital.

Morphine.—At times nothing but morphine administered hypodermically in doses of gr. $\frac{1}{8}$ to $\frac{1}{4}$ is of any avail. *A priori* one would not select it as a hypnotic or anodyne, but experience has proved it to be reliable, and not so unsafe as to exclude its use. It is almost certain that, when painful adenitis complicates the cerebral intoxication, morphine effects its purpose. The safest method of administration is in combination with atropine.

Bromide of Potassium.—An occasional dose of bromide of potassium during delirium is useful and without danger, but its prolonged use is not permissible.

Diarrhœa.—An occasional looseness should not be stopped unless it continues over twelve hours and the patient seems exhaused thereby. It is but seldom obstinate and yields to salol in gr. x doses, or to an enema of starch and opium; or, still better, a suppository of morphine and cocaine, gr. $\frac{1}{4}$ and gr. $\frac{1}{2}$ respectively, more especially when continued straining persists (Lowson).

Vomiting frequently ushers in an attack of plague, and may persist throughout the illness. When the latter condition obtains, it is an unfavourable sign, as loss of strength ensues owing to the rejection of food and medicines. A mustard plaster to the epigastrium, ice to suck, and an effervescent draught of a few drops of hydrocyanic acid and liquor morphiæ are generally sufficient to check this untoward symptom (Lowson).

Pyrexia, no doubt, accounts for some of the delirium, the restlessness, the headache and subsequent collapse. Hyperpyrexia is exceptional. The usual chemical antipyretics, antipyrin and phenacetin, are such severe depressants that they are at a discount and should not be used. Should hyperpyrexia necessitate its use, one hypodermic of antipyrin is, no doubt, justifiable, but only as a last resource. Frequent sponging with tepid water, ice to the head and nape of the neck, iced drinks, and a short application of the wet pack, with the administration of brandy by the mouth or by the rectum, are useful when promptly and rationally used.

Stimulants, Externally.—Flying blisters of mustard to the limbs, abdomen and over the heart are useful. Smelling-salts and strong ammonia applied to the nostrils often succeed in restoring the pulse, rousing the patient in collapse, and not infrequently cause him to rally from what seems a moribund state (Lowson). Nor is this kind of stimulation of mere passing effect, for in several instances when death seemed inevitable and at hand, patients have revived and actually recovered permanently.

Stimulation by *hypodermic* injection of ether is a treatment that gives grateful response, and must be used freely and frequently. The collapse from plague does not take place at that period of the disease when organic structures are played out, but it occurs early in the disease, in two or three days, and is therefore more of a functional or toxic than of an organic nature; consequently, the use of stimulants, in whatever form, is more likely to be attended by remedial results and not by a mere temporary flicker of response.

Internally, the form of drug most useful is either a general stimulant, such as ammonia, or a cardiac tonic or specific.

The prescription of every practitioner who treats plague will be found to be one in which carbonate of ammonia and the tincture or decoction of cinchona are met with, and with this mixture now given, now withheld, will be exhibited digitalis, strophanthus, or camphor. More good is ascribable to ammonia in some form than to any other known and more specific drug.

Digitalis in infusion, tincture or in leaf—the latter perhaps the best—seems the one drug called for when the pulse becomes dicrotic and the nervous stimulation of the heart gives out. In practice, however, it is unsatisfactory, and seldom can any good results be traced to its administration. No doubt, the slowness of its action is against it; but, what is still more, positive evidence is against its being considered a reliable drug in an acute illness like plague.

Strophanthus is in the same category with digitalis.

Camphor in its double action as a direct cardiac stimulant and a stomachic carminative is useful as an alternative drug. Undoubtedly the best form is in pill in doses of gr. ij. Camphor may advantageously be used hypodermically dissolved in sterilised oil. *Caffeine* also is worthy of trial.

Musk, in the few cases treated therewith, seems to justify its administration, and it is a form of circulatory stimulant which one welcomes as an addition to one's resources. The musk, as fresh as can be obtained, may be given in 5-grain doses every six hours as an expedient.

Strychnine, administered by the mouth or hypodermically, is of the greatest use. Granted that a functional abeyance of the nervous influence, more especially of the heart, is the essence of the toxic effect of the plague bacillus, strychnine ought to be a drug of importance in the treatment. This expectation was borne out in practice, and Dr. Lowson in his report, and all who have reported on the treatment of plague, regard strychnine as a most reliable agent in the form of stimulation required in plague. Liquor strychninæ in 5 to 10 minim doses, given every four hours, is the most convenient form; but when vomiting is present, a hypodermic solution of gr. $\frac{1}{15}$ of the sulphate of strychnine in 10 minims of distilled water is advisable.

Other drugs may be mentioned, but, though useful as a change and a stand-bye on occasions, they do not justify more than a passing notice. Among the more important are *quinine* when malaria complicates the disease, as evidenced by a large spleen; *aconite* in the early stages, when high fever and a full pulse are present; *chloride of ammonium* as an alternative is occasionally useful.

The inhalation of oxygen (Lowson) is not to be neglected, and the gas ought to be always at hand and ready for immediate use.

The result of experience gained by local, radical or tentative *treatment of the glands* does not lead one to expect much benefit from there. That abscesses should be opened when they point, or when fluctuation is perceptible, is, of course, natural; but that local remedial steps should be undertaken for the purpose of affecting the course of the disease by acting on the gland is, from what we know of the pathology of the disease, scarcely rational. Injection of a swollen gland when it is accessible, as in the groin, with such substances as carbolic acid, perchloride of mercury, or a solution of the perchloride of mercury and iodide of potassium, has perhaps a theoretical basis of justification, but practically little good can be ascribed to it. The latter-mentioned solution may have a higher claim, as in several cases in which it has been administered temperature falls and the patient seems easier. It may be, however, that the mere pricking of the tense capsule of the gland, even by needle punctures, may serve to relieve tension and thereby pain. This leads one to the belief that subcutaneous incision of the gland may be attended with beneficial results, and it is a method of surgical procedure not without precedent. Early free incision of the gland is not to be recommended, nor can excision be in any way justified. The disease is a polyadenitis, and of so extensive a nature that eradication of infected glands is an impossibility. A gland when swollen, red and painful may be smeared with glycerine and belladonna or poulticed to relieve pain, and when fluctuation is perceptible it should be opened, but further procedure is useless. When pus is evacuated, dusting the wound with iodoform and ensuring thorough drainage are the means by which the best results are obtainable.

Retention of Urine, a frequent concomitant during the delirium of plague, renders the use of the catheter imperative.

No. 556.

Copy forwarded to the Government of Madras for information.

(By Order.)

HOME DEPT. (SANITARY), CALCUTTA, 18*th February* 1897.

(Signed) R. NATHAN,
Offg. Under Secy. to the Govt. of India.

ORDER—No. 298 M., dated 26th February 1897.

Communicated to all Local Boards and Municipal Councils, the Municipal Commissioners of Madras, the Surgeon-General and the Sanitary Commissioner.

(True Extract.)

Secretary to Government.

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„ all Chairmen of Municipal Councils.
„ the President, Municipal Commission, Madras.
„ the Surgeon-General.
„ the Sanitary Commissioner.

Exd. A. Raitt.

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Local & Munl. (1897) Department.

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From The Government of India, Home Department.

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LOCAL & MUNICIPAL DEPT.

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By JAMES CANTLIE, M.B.Aberd., F.R.C.S.Eng.,
Lecturer on Applied Anatomy at Charing Cross Hospital Medical School;
late of Hong Kong.

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Stimulation by *hypodermic* injection of ether is a treatment that gives grateful response, and must be used freely and frequently. The collapse from plague does not take place at that period of the disease when organic structures are played out, but it occurs early in the disease, in two or three days, and is therefore more of a functional or toxic than of an organic nature; consequently, the use of stimulants, in whatever form, is more likely to be attended by remedial results and not by a mere temporary flicker of response.

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The prescription of every practitioner who treats plague will be found to be one in which carbonate of ammonia and the tincture or decoction of cinchona are met with, and with this mixture now given, now withheld, will be exhibited digitalis, strophanthus, or camphor. More good is ascribable to ammonia in some form than to any other known and more specific drug.

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LOCAL & MUNICIPAL DEPT.

C. I. C. P. O.—No. 655 H. D.—8-12-96.—200.—R. R. C.

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The inhalation of oxygen (Lowson) is not to be neglected, and the gas ought to be always at hand and ready for immediate use.

The result of experience gained by local, radical or tentative *treatment of the glands* does not lead one to expect much benefit from there. That abscesses should be opened when they point, or when fluctuation is perceptible, is of course natural; but that local remedial steps should be undertaken for the purpose of affecting the course of the disease by acting on the gland is, from what we know of the pathology of the disease, scarcely rational. Injection of a swollen gland when it is accessible, as in the groin, with such substances as carbolic acid, perchloride of mercury, or a solution of the perchloride of mercury and iodide of potassium, has perhaps a theoretical basis of justification, but practically little good can be ascribed to it. The latter-mentioned solution may have a higher claim, as in several cases in which it has been administered temperature falls and the patient seems easier. It may be, however, that the mere pricking of the tense capsule of the gland, even by needle punctures, may serve to relieve tension and thereby pain. This leads one to the belief that subcutaneous incision of the gland may be attended with beneficial results, and it is a method of surgical procedure not without precedent. Early free incision of the gland is not to be recommended, nor can excision be in any way justified. The disease is a polyadenitis, and of so extensive a nature that eradication of infected glands is an impossibility. A gland when swollen, red, and painful may be smeared with glycerine and belladonna, or poulticed to relieve pain, and when fluctuation is perceptible it should be opened, but further procedure is useless. When pus is evacuated, dusting the wound with iodoform and ensuring thorough drainage are the means by which the best results are obtainable.

Retention of Urine, a frequent concomitant during the delirium of plague, renders the use of the catheter imperative.

LOCAL & MUNICIPAL DEPT.
CURRENT No. 814 M

No. 556

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CHIEF SECRETARY
23 FEB. 1897
GOVERNMENT OF MADRAS

HOME DEPARTMENT,
(Sanitary);
Calcutta, the 18th February 1897.

By order, etc.,
Offg. Under Secretary to the Govt. of India.

C. I. C. P. O.—No. 655 H. D.—8-12-96.—200.—R. R. C.

Government {1897} of Madras.

LOCAL AND MUNICIPAL.

Recd. } 1897. *Enclosures*

Regd. *Spare copies*

G.O., No. 298 M., 26th February 1897.

FEBRUARY.

Treatment of Bubonic Plague.

Communicating to all Local Boards and Municipal Councils, the Municipal Commissioners of Madras, the Surgeon-General and the Sanitary Commissioner, copy of remarks on the — by Mr. James Cantlie, M.B.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

READ—the following paper :—

Remarks on the treatment of Bubonic Plague, by JAMES CANTLIE, M.B. ABERD., F.R.C.S. ENG., Lecturer on Applied Anatomy at Charing Cross Hospital Medical School; late of Hong Kong.

At first sight it would seem as though the treatment of plague was a subject which it is useless to discuss, as it is repeatedly stated that we have no cure for plague. We have no "cure" for many—nay, most—of our diseases; yet experience has shown that although no specific treatment is known, still with care, judicious nursing and medical supervision, ailments, such as typhoid, cholera and zymotic diseases generally, can be, and are, conducted to a successful termination. Much, therefore, as it is desirable to know what will "cure" the disease, it is not consistent with our behaviour in other illnesses to stand by and wait until it is discovered what form of attenuated virus may be tried as a specific remedy.

Once for all let it be understood that in no disease does one get such immediate results from careful and prompt medical treatment, and as a direct outcome of watchful nursing, as in plague; and perhaps one ought to add to that, "in the case of Europeans."

Natives, whether of China or India, succumb more readily to plague than Europeans. There are one or two reasons for this: (1) A native seldom comes to a doctor (a European doctor most of all) until the disease is well advanced. (2) In point of stamina the poorer natives are a long way below northern Europeans. (3) The inherited dislike of the native for all forms of stimulants, be they medicinal or alcoholic, during illness. (4) The belief of the natives in the old adage that "to starve a fever" is correct. The difference between Europeans and natives was well illustrated, during the 1894 epidemic in Hong Kong, by the fact that, out of 11 British patients, 9 recovered—a mortality of only 18·2 per cent.—whilst the Chinese died at the rate of something like 95 per cent. This favourable result cannot, however, be ascribed altogether to racial influence; it was rather due to the effect that medical treatment and good nursing had upon the course of the disease. The British patients were seen early in the disease. They could take, and stand, stimulants, medicinal and alcoholic, well, and the result was the satisfactory number of recoveries which took place. Even with such Asiatics as would submit to similar treatment, most markedly in the case of the Japanese doctors, were the satisfactory results of treatment during plague manifest.

The attendance of the doctor must be prompt, and his treatment must be decisive. In fact, during the first five days of illness in plague the doctor must be within a few minutes' call. To each ward of a hospital a doctor should be assigned, or, if a valuable life is at stake in a private house, medical aid must be obtainable in a few seconds. The changes are so rapid in plague, the features of the disease so fulminant, that without immediate treatment being possible success is hopeless.

NURSING.

In a hospital ward, during the first five days of illness, practically two patients require an attendant to themselves if the utmost good possible is to be done. A nurse must never let her patient out of sight for a moment, be the patient asleep or awake. She cannot leave the ward or room, without posting a deputy, for any purpose whatever. No nurse should be on duty for more than eight hours at a time; still better is it to follow the four hours' "watches" kept at sea.

The number of nurses required may seem outrageous, but we have in many illnesses a day and night nurse for private patients, and no more is demanded in this the most fatal illness known. Of course, plague comes in epidemics, and the number

of nurses is limited, no doubt; but we must not lose sight of what is necessary in considering what is expedient. Shortly, it may be put that a liberal supply of doctors and nurses is essential if the lives of the plague-stricken, be they native or European, are to be saved.

Enough has been said as to the rapidity of the onset, the development, and the fatality of plague, to make the importance of early treatment in the disease and of the requisite promptness in its administration understood. The symptoms and signs change so rapidly, and in such varying succession, that no stereotyped line of treatment can be followed. Now it is delirium which calls for relief, now cardiac distress, or vomiting may supervene; or an unexpected loss of pulse, or a collapse totally without warning, may carry off the patient before any help is obtainable. The much despised legend "Treat symptoms as they arise" is the maxim in plague, and if the word "promptly" were added, the summary of plague treatment is before us. The disease is caused by a bacillus, the toxic effects of which upon the blood give rise to functional derangements of possibly all organs, but most markedly of the nervous system, central and peripheral. The poison is so acute that, with the exception of the glandular inflammation, but little structural change is met with in the more vital organs. The cardiac trouble which is so marked an accompaniment of the disease is evidently a functional one and the result of derangement of the nervous supply of the heart. This has constantly to be borne in mind when the subject of drugs is dealt with.

The subject of segregation, temporary hospitals, quarantine, and disinfection generally, are not dealt with here. I propose merely to deal with general and medicinal treatment.

GENERAL TREATMENT.

The essentials are of free ventilation, a cool room (60° to 70° F. where such is possible), a plentiful supply of hot and cold water, ice, a sufficiency of servants, and, of course, all the appliances of a modern hospital. Deaths are so frequent and so sudden that when the hospital is large it is necessary to have men employed whose duty it is to remove, to disinfect and to dispose of the dead.

Nothing should be allowed to leave the ward but to be disinfected. Crockery and glass should be scalded. Fæces should be sprinkled with quicklime; bed and bedding if not burnt are to be disinfected by heat; the steam disinfector is well nigh essential. Scrupulous cleanliness of the floor and bedsteads, obtained by washing with a disinfectant solution, are of primary importance, and all doorways should be curtained by a sheet wet with carbolic acid, Jeyes', or other reliable antiseptic.

The patient should not be allowed to get out of bed for any purpose, but the use of the bedpan and urine bottle should be insisted on. So many times has it occurred that the patient has tumbled over dead whilst getting up to stool, &c., that this is an imperative measure to insist upon.

MEDICINAL TREATMENT.

Purgation.—When the patient is first seen, the foul state of the tongue, the foul breath, the jaundiced tinge of the conjunctivæ, and a generally bilious aspect, suggests a purge. For this purpose, calomel in 5-grain to 10-grain doses recommends itself. This is to be followed by a saline in some five hours' time. Against this treatment it may be argued that the drain upon the system and the lowering action of calomel are deleterious, but, if given quite early in the disease and not when the pulse is flagging, it undoubtedly seems to do good. It frequently stops vomiting, which is often present; it clears away the jaundiced aspect, it restores the power of taking nourishment, and it seems to diminish mental aberration and cardiac distress. If a full gall-bladder justifies the exhibition of calomel, *post-mortem* evidence of that condition is not wanting. So far as is known, bacilli of plague escape from the body in greatest numbers by the bowel. In the breath, sweat or urine, bacilli are but sparsely met with, but in the fæces a rich supply is found. This points to the necessity of ample disinfection as being requisite for all latrines, bedpans, closets, &c., but it also proclaims as justifiable and rational the attempt to assist nature in expelling the poison of plague by a free action of the bowels.

Stimulation.—From the very first onset, or certainly after twenty-four or forty-eight hours, it will be found necessary to stimulate the plague patient by food, by alcohol, or by medicine.

Food.—Unless the patient is actually delirious, there is not usually much difficulty in feeding plague patients. In fact, in comparison with allied ailments, appetite is wonderfully good. One encourages this in a general way, but the occurrence of sudden death supervening after the ingestion of a full bowl of rice, for example, and its accompaniments, in the case of Chinese patients on several occasions, leads one to the belief that a full meal is not without its danger. The heart is in such a condition that it takes but little to disconcert its rhythm, and the pressure consequent upon a full stomach is calculated to do this. Food should be in small quantities frequently repeated and of a kind which is easily digested. Brand's essence of beef, in fluid or jelly form, is excellent, but any beef jelly will do. Ox-tail soup, mutton broth, beef and chicken tea should be constantly on hand to suit the varying palate of the patient. Conjee water—that is, the water in which rice is boiled—is useful as a drink and serves as nourishment. Milk with ice (sipped slowly) and ice cream (Lowson) are particularly grateful.

Drink.—Thirst is at times a marked symptom, and its relief should be attended to by allowing the patient anything in reason. Ice to suck, if not kept up too long; water or lemon and water (not lemonade) to drink, if not in such quantity as to distend the stomach; beer and stout iced, especially for Europeans, is "at once stimulant, soporific, nutritious and thirst-quenching" (Lowson). Brandy or whisky diluted with not more than three or four times its quantity of water (not aërated waters) should be freely supplied. When the pulse shows signs of failing or collapse or faintness supervene, then, of course, alcohol is doubly beneficial, and brandy is preferable to whisky as a cardiac stimulant.

Delirium.—When active the delirium of plague is best combated by cold to the head. Leiter's coil would be perhaps the readiest method, provided the patient could be kept still, but an ice-bag or a constantly-wetted cloth is efficient. These applications combined with tepid sponging of the body at frequent intervals seem grateful to the patient, are useful means of reducing temperature, and seem the safest and readiest method of quietening active delirium.

Hyoscine.—In most cases, but not in all, hyoscine administered hypodermically in doses of gr. $\frac{1}{100}$ is perhaps the most efficient and safe of the hypnotics. It calms the nervous system and induces sleep when everything else fails. Hyoscine should be one of the first drugs in the armamentarium of a plague hospital.

Morphine.—At times nothing but morphine administered hypodermically in doses of gr. $\frac{1}{8}$ to $\frac{1}{4}$ is of any avail. *A priori* one would not select it as a hypnotic or anodyne, but experience has proved it to be reliable, and not so unsafe as to exclude its use. It is almost certain that, when painful adenitis complicates the cerebral intoxication, morphine effects its purpose. The safest method of administration is in combination with atropine.

Bromide of Potassium.—An occasional dose of bromide of potassium during delirium is useful and without danger, but its prolonged use is not permissible.

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The inhalation of oxygen (Lowson) is not to be neglected, and the gas ought to be always at hand and ready for immediate use.

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Retention of Urine, a frequent concomitant during the delirium of plague, renders the use of the catheter imperative.

No. 556.

Copy forwarded to the Government of Madras for information.

(By Order.)

Home Dept. (Sanitary),
Calcutta, 18*th February* 1897.

(Signed) R. NATHAN,
Offg. Under Secy. to the Govt. of India.

Order—No. 298 M., dated 26th February 1897.

Communicated to all Local Boards and Municipal Councils, the Municipal Commissioners of Madras, the Surgeon-General and the Sanitary Commissioner.

(True Extract.)

G. S. FORBES,
Secretary to Government.

To all Presidents of District Boards.
„ all Chairmen of Municipal Councils.
„ the President, Municipal Commission, Madras.
„ the Surgeon-General.
„ the Sanitary Commissioner.
Copy to the Public Department.
„ „ Revenue Department.

Exd. A. Raitt.

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