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**Prisoners' Veins: Failures and
Advances in the Treatment of
Cholera**

As historians, we are well aware of the high case fatality, morbidity and mortality rates of the cholera epidemics that swept across Great Britain in the 1830s. In 1831 and 1832

there was a combined total of over twenty thousand deaths in England and Wales alone.¹ Even uttering the word cholera in this day and age still evokes feelings of fear, disgust, and unsettling mental pictures of the monumental suffering that typifies this dreadful condition. Thankfully, today there is effective medical treatment for cholera, but in the 1830s the cause of cholera was unknown and a successful method of treatment continued to elude medical practitioners. One has only to examine contemporary publications in the *Lancet*, *Medical Times* and the *Cholera Gazette* to obtain a sense of physicians' desperate and seemingly impossible endeavour to discover a cure for this indiscriminate and fatal disease.

Among these medical professionals were William Brooke O'Shaughnessy, William Stevens and Thomas Latta, whose researches marked the beginning of an important turning point in British medicine. They proposed a shift away from the more trusted antiphlogistic paradigm of treatment, which involved emetics, calomel purgatives, cupping and bloodletting, and instead endeavoured to restore the body back to its natural state by hydration and heat therapy. Much has been written in recent historiography regarding the history of intravenous saline. Indeed, the researches of Morris, Baskett, Cosnett and McGillivray provide a thorough account of the work of O'Shaughnessy and Thomas Latta, and

¹ See R.J. Morris, *Cholera 1832* (London: Croom Helm, 1976), 13–16, for detailed mortality rates in England and Wales. For more information regarding all cholera epidemics in Great Britain, see S.J. Snow, 'Commentary: Sutherland, Snow and Water: The Transmission of Cholera in the Nineteenth Century', *International Journal of Epidemiology* 13(5), 2002, 908–11.

their contributions to the origin of intravenous saline.² There is, however, very little account of the efforts of William Stevens and his research into cholera involving prisoners. This paper will illustrate how the experimental use of saline drinks and venous injections on convict cholera patients at Coldbath-Fields Prison contributed to the beginning of a major paradigm shift in the treatment of inflammatory disease in British medicine, and to the understanding of human haematology in general. It will show how the research led to therapeutic trials on convict patients in the hulks at Chatham and Woolwich, and how the successes and failures of this work marked an important contribution to the future discovery of the ingredients of Ringer's solution; the ingredients of the 'saline drip' (which is still used in the present day to treat cholera and other conditions that require intravenous hydration).

In her chapter on 'History of Pathology' in *History of Medicine*, Jacalyn Duffin asserts that in the early nineteenth century there was a 'synthesis between anatomy and clinical medicine'; an approach where symptoms can explain anatomical changes to the body.³ I will not go into very much detail here into the aetiology or pathogenesis of cholera. I will, however, explain some of the most relevant morbid changes to

² Morris, *Cholera 1832*, 166–8; T.F. Baskett, 'William O'Shaughnessy, Thomas Latta and the Origins of Intravenous Saline', *Resuscitation* 55, 2002, 231–4; N. MacGillivray, 'Dr Latta of Leith: Pioneer in the Treatment of Cholera by Intravenous Saline Infusion', *Journal of the Royal College of Physicians Edinburgh* 36, 2006, 80–5; and J.E. Cosnett, 'The Origins of Intravenous Fluid therapy', *Lancet* 1, 1989, 768–71.

³ Jacalyn Duffin, *History of Medicine: a Scandalously Short Introduction* (Toronto: University of Toronto Press, 1999), 77.

the body that set cholera apart from other dysenteric diseases, because it is the appearance of these symptoms that explain why O'Shaughnessy and Stevens developed their hypotheses. The onset of the symptoms of cholera is sudden; these include violent purging from both the upper and lower digestive tract. After all matter within the tract is purged, only a white liquid is excreted until the patient has an emaciated appearance, and inevitably dies as a result of extreme dehydration.⁴ Once the patient has the emaciated appearance (otherwise known as sunken features), the skin appears blue, which is why in some parts of the British Empire cholera was referred to as the 'Blue Fever' or the 'Blue Epidemic'.⁵ Unlike other fevers and dysenteries, cholera lowers the body temperature; the patient is cold to the touch, and exhales cold air instead of warm air. During the emaciated state, the patient's pulse is not perceptible from the extremities, but is faintly perceptible from the carotid arteries in the neck.⁶ William Bynum and others rightly assert that from the time of antiquity the term cholera was used by physicians for most diseases that involved the sudden onset of vomiting, diarrhoea and painful gripping.⁷ When contemporary doctors reported these symptoms, the medical historian is assured that there was no misdiagnosis, and the

⁴ William Fream, *Aids to Tropical Hygiene and Nursing*, 5th ed. (London: Balliere, Tindal and Cox, 1964), 43–7.

⁵ William O'Shaughnessy, 'Proposal of a New Method of Treating the Blue Epidemic Cholera', *Lancet* 17, 10 December 1831, 366.

⁶ Fream, *Aids to Tropical Hygiene and Nursing*, 43–7.

⁷ William Bynum, *Science and the Practice of Medicine in the Nineteenth Century* (Cambridge: Cambridge University Press, 1994), 74.

disease in question was definitely cholera as we still see it today.

For O'Shaughnessy and Stevens, these symptoms were a sign that the disease had caused a 'morbid alteration of the blood', which led to a complete stagnation of the venous system. In an 1832 paper titled 'Observations on the Blood', Stevens theorised that 'in health [the blood] invariably contains ... a given proportion of saline matter' and that the blood owes its red colour to the presence of this saline matter.⁸ Stevens' new approach for treating cholera was to reverse the stagnation of the venous system, by restoring this saline balance and replacing the fluid lost to the body. He hoped that this would invariably restore the pulse to the extremities, and raise the body temperature to a more healthy level.⁹ It was this approach that set it apart from the more traditional treatments: to restore what was lost, rather than purge or bleed what was believed to have been poisoned.

Prison inmates affected by the morbid cholera at Coldbath-Fields Prison in London were the ideal controlled population to trial Stevens' new and potentially more effective treatment for cholera. This treatment involved three main steps: first, the patients' symptoms were stabilised by the oral administration of Sleidlitz powder (a sort of sodium bicarbonate, with tartaric acid), which helped to settle the

⁸ William Stevens, 'Observations on the Blood', in *Observations on the Healthy and Diseased Properties of the Blood*, ed. William Stevens (London: Murraray, 1832), 362.

⁹ *Ibid.*

stomach (and acted as a very mild aperient).¹⁰ Second, the patient was hydrated with a tumbler of water containing carbonate of soda, muriate of soda and chlorate of potassium (which is not unlike our modern-day soda water), and this was administered from every fifteen minutes to every half-hour.¹¹ The third stage was to restore the temperature of the blood to its natural state, so as to better absorb the saline. A solution of muriate of soda and saline was injected into the rectum, at as high a temperature as the patient could bear. This was a means to raise the body temperature. Patients were then put into a hot saline bath, where they were encouraged to breathe in the hot vapours. Stevens rightly believed that saline could be absorbed through the skin, and felt this would benefit the patient by checking the muscle cramps while helping to raise the body temperature. Drinks of Seltzer water and green tea were given *ad libitum*, and a fire was burned in each room to keep the patient warm.¹²

The results were both remarkable and encouraging. At the time of the trial there was a total of one hundred cholera patients, and all were given Stevens' new treatment. Out of this hundred, only three patients died.¹³ Stevens believed that the fatal cases were dismissed too soon from the warm ward, and that the cold air of the prison brought about a relapse of symptoms.¹⁴ This was quite a remarkable conclusion, because

¹⁰ Ibid., 458.

¹¹ Ibid., 459.

¹² Ibid., 459–60.

¹³ Ibid., 466.

¹⁴ Ibid.

indeed the bacteria *vibrio cholera* does breed faster in colder environments, but Stevens did not know of this fact, so his conclusions were based purely on empirical observation. It should be mentioned here that prior to Stevens' involvement with the prisoners' medical treatment, four cholera patients in the prison were treated with brandy, chalk and opium, without any success.¹⁵ After a short illness, those patients died. News of Stevens' successful treatment, however, reached the town, where a practitioner named Mr Whitmore adopted the treatment for his own patients. Out of thirty cholera patients, only two died; this was an encouraging result at a time when so little was understood about the disease.¹⁶

News of the success of Stevens' treatment also spread to the attending physicians to the convicts aboard the hulks at Woolwich. Intrigued by the use of saline, Peter Bossy, MD, trialled variations on Stevens' treatments, but modified them with already established practices of the antiphlogistic paradigm. A few cases of cholera appeared in the establishment in March 1832, with the majority of the convict establishment labouring under the disease by 6 May 1832.¹⁷ Essentially, Bossy divided his patients into groups based on the severity of their symptoms and modified his treatments accordingly. Until reading of the success of the treatment at Coldbath-Fields Prison, the principal treatment had been cautious bloodletting, salt and mustard emetics, and mustard

¹⁵ Ibid., 463.

¹⁶ Ibid., 473.

¹⁷ William Stevens, *Observations on the Nature and the Treatment of the Asiatic Cholera* (London: Hippolyte Bailliere, 1853), 442.

poultices. All future cases labelled 'Bleeding and Salines' and 'Salines Only' incorporated the saline mixture (with other treatments). The varieties of treatments are outlined in the table below.

Table 1: Cholera Treatments at Convict Hulk Establishment, Woolwich.¹⁸

Treatment class	Treatment plan
Bleeding and Stimulant	Venesection (8 oz), salt and mustard emetics, hot water enemata, mustard cataplasms (externally), brandy, ammonia and cayenne pepper (internally). No opium.
Stimulants Only	Brandy
Bleeding and Salines	Venesection (8 oz), salt and mustard emetics, mustard poultices, saline solution, (every half hour) brandy, calomel, opium (every two hours).
Salines Only	Salt water emetic, saline mixture (every half hour), soda (every hour), opium and barley water.

The results were varied, but Bossy spoke very highly of the new treatment (so long as it was carefully combined with existing treatments). His results show a higher percentage of recovery among those patients who received the variation with saline treatments. According to Bossy, this success owed to the patient being treated as soon as possible, before (or just after) the onset of collapse.

¹⁸ Ibid., 442–4.

Table 2: Results of Cholera Treatments at Convict Hulk Establishment, Woolwich.¹⁹

Treatment	Cases	Deaths	Recoveries	Survival Rate
Bleeding and Stimulants (brandy)	13	5	8	61%
Stimulants only	4	1	3	75%
Bleeding and Salines	56	11	45	80%
Salines only	65	9	56	86%
Total	138	26	112	81%

The search to find a more successful treatment for cholera did not stop at Stevens' endeavours. In a paper presented to the Westminster medical society in December 1831, O'Shaughnessy observed that the colour of blood within the arteries was a rich red colour, and blood from the veins was blue. He rightly theorised that this was owing to oxygenation of the blood.²⁰ He then stressed that cholera and other diseases (including yellow fever) that cause a morbid alteration of the blood, may for some unknown reason render the body incapable of oxygenating blood.²¹ Like Stevens, O'Shaughnessy stressed that in cholera in particular, the body turns blue, the patient's temperature is cold, and the imperceptible pulse was a direct result of the 'stagnation of the venous system' caused by the cholera poison. Unlike Stevens, O'Shaughnessy's methodology was to restore the diseased blood of the cholera patient back to its healthy red

¹⁹ Ibid., 443.

²⁰ William O'Shaughnessy, 'Proposal of a New Method of Treating the Blue Epidemic Cholera', *Lancet* 17, 10 December 1831, 367.

²¹ Ibid., 370.

colour by restoring the ability for the blood to carry oxygen (as well as an endeavour to rehydrate the patient).

O'Shaughnessy advised that oxygenated salts of nitrate or chlorate of potassium be injected into the venous system. Prior to the operation, a sample of the black diseased blood was to be taken from the patient and mixed with the oxygenated salts to make sure that the composition of the salts were correct. This was done by simply watching the blood change colour. After this test the patient could be injected with the solution. The syringe provided no more than three ounces of the oxygenated salts; the solvent should be warmed to the same temperature of the blood, so as to not shock the patient. O'Shaughnessy then advised that other physicians should trial this treatment on any subsequent cholera patients that came under their care. He did stress, however, that sodium chloride injected into the veins would indeed restore the blood back to its red colour, but would be of little use to the patient because it does not contain oxygen.²² The treatment was purely about restoring the blood to its natural state, so that it was once again capable of carrying oxygen.²³

The biggest problem faced by O'Shaughnessy and Stevens was that doctors who decided to trial their proposed new treatments tended to add their own ingredients to the mixtures as they saw fit, and in some cases this significantly altered the outcome of any subsequent experiments. We must remember that at this point in history the discovery and

²² Ibid., 371.

²³ Ibid.

understandings of human haematology was very much at its infancy, so what O'Shaughnessy was proposing was met with a lot of criticism. Some physicians had a decided confidence in the virtues of saline alone.²⁴ This is not to unfairly criticise these physicians, highlighting where these doctors went wrong with their ideas, but merely to mention that they had good reason for believing what they did at the time.

Dr John Anderson, surgeon to the *Aboukir* convict hospital ship at the Chatham Hulk establishment, was no exception. In a letter to the *Lancet* dated 17 June 1832, Anderson triumphantly yet prematurely concluded that injections of saline had proven to be a successful mode of treatment.²⁵ The first two cases that he selected for trial had been labouring under the 'collapsed' phase of cholera for about fifteen hours, and by then both patients had a permanent serous discharge.²⁶ The patients were treated with four pints of saline into the veins. There was no detail of the concentration of saline. Both patients at first responded well to the treatment; their natural colour returned, their pulse returned to the extremities and they seemed quite well. Within half an hour, however, severe rigors took place and the patient again assumed the emaciated appearance.²⁷ The treatment was repeated for the best part of twelve hours, but the patients died. Dr Anderson did note that the whole time the serous

²⁴ John Anderson, 'Cases of Malignant Cholera Treated by the Injection of Saline Fluids into the Veins', *Lancet* 18, 23 June 1833, 369.

²⁵ *Ibid.*

²⁶ *Ibid.*

²⁷ *Ibid.*

discharged remained unchecked. He decided to try the experiment again, this time by administering the injections to patients in the collapsed phase, but who had not yet developed the symptoms of serous discharge. Three patients were selected for treatment and at the time of the publication of the article, they had survived, which led Anderson to conclude that the time of the administration of the injections was crucial to the success of the treatment; they survived because they were treated before the onset of serous discharge.²⁸

Without falling into the trap of what Jacalyn Duffin refers to as ‘presentism’,²⁹ I will now mention some of the negative results of both the venous injections and saline treatment. At the same convict establishment, Archibald Robertson, surgeon to the *Cumberland* hulk, trialled both treatments, and ‘deeply lamented’ having trusted them, especially since his treatment plan of oral hydration of cold water, mustard emetics, calomel and venesection had been working.³⁰ One has to wonder why he stopped a successful method of treatment to trial a new one, other than outright curiosity. He spoke of his colleague, the aforementioned John Anderson, who so strongly advocated the new treatment, saying that the patients he thought were convalescent, ‘now number among the dead’.³¹ Robertson’s tabulated results, as published in the *Lancet*,

²⁸ Ibid.

²⁹ Jacalyn Duffin, *History of Medicine*, 373–5.

³⁰ Archibald Robertson, ‘Treatment of the Malignant Cholera on Board the Cumberland Convict Hulk’, *Lancet* 18, 4 August 1832, 557.

³¹ Ibid.

showed a significant deviation from O'Shaughnessy's recommended plan (which may account for the failure of the treatment). Only saline was used in the injection, not oxygenated salts, and varying amounts were given to each patient. Out of nine cases of cholera, only one patient survived the saline treatment, resulting in a mortality rate of eighty-eight per cent. With the mustard emetic, however, out of 198 cases treated with the mustard emetic, nineteen died (fourteen of which were already in hospital labouring under serious illness), which resulted in a mortality rate of only nine per cent.³² With this in mind, Robertson decided to abandon the new treatments and resumed his trusted treatment with the mustard emetic.³³

Among all of this negativity, there was also another physician with the same zeal as Stevens and O'Shaughnessy for finding a cholera cure. Thomas Latta believed that there was virtue in the idea of restoring the blood from its diseased state, back to its healthy state; he proposed to combine the idea of Stevens' saline bath and O'Shaughnessy's venous injections. Observing other practitioners' unsuccessful experiments, he found that too large a quantity of fluid was injected into the veins, and that the use of saline alone was injurious to health.³⁴ Accordingly, Latta proposed a serum that comprised of a pound of water (that had previously been boiled for half an hour and allowed to cool) be saturated with half a drachm

³² Ibid.

³³ Ibid.

³⁴ Thomas Latta, 'Saline Venous Injection in Cases of Malignant Cholera Performed While in Vapour Bath', *Lancet* 19, 3 November 1832, 173.

of protoxide of nitrogen and eight grains of muriate of soda.³⁵ Five patients in Leith were selected for trial. They were allowed to lie over the vapour bath, which was kept at a constant ninety-six degrees Fahrenheit, and were allowed to drink cordial at will. The artificial serum was then injected into the veins at a temperature of ninety-eight degrees Fahrenheit.³⁶ All patients treated had their normal appearance and colour restored; purging and vomiting either diminished or stopped altogether, and within twenty-four hours the patients were convalescent. Out of five cases trialled there was only one death, which resulted in an eighty per cent success rate of the treatment.³⁷

These positive results showed that by restoring what was lost in the blood, the body was better able to recover naturally from the cholera. Unfortunately the success of these experiments and the subsequent research was met with some scepticism from the medical fraternity. Critics of O'Shaughnessy and Stevens were doubtful that their cases were that of cholera, and were rather just classic cases of diarrhoea. Indeed, the Board of Health all but dismissed Stevens' findings altogether.³⁸ The research into a cure for cholera by means of venous injections thus reached a hiatus

³⁵ Ibid., 174.

³⁶ Ibid.

³⁷ Thomas Latta, 'Saline Venous Injection in Cases of Malignant Cholera Performed While in Vapour Bath (follow-up article)', *Lancet* 19, 10 November 1832, 208.

³⁸ Stevens, *Observations on the Nature and the Treatment of the Asiatic Cholera*, 22–5. See also T.F. Baskett, 'William O'Shaughnessy, Thomas Latta and the Origins of Intravenous Saline,' *Resuscitation* 55 (2002): 233.

for about thirty years. Awad and Allison attribute this to the failure of contemporary physicians to give repeated doses, and adequately follow instructions. The interest in saline intravenous hydration resurged in the 1860s owing to a discovery of the resuscitative effects of saline solution in cases of haemorrhage and trauma.³⁹ In 1883, physician Sydney Ringer decided to look into the virtues of restoring blood to its natural state, and the effects of saline on the heart muscle.⁴⁰ In doing this he considered Stevens' earlier studies of using distilled water with the saline. By this time, proteins had been discovered, as had electron theory, which better enabled practitioners to see how elements of the blood reacted with particular substances. Instead of Ringer's discoveries (or rather 're-discoveries') being heard in an environment of obstinate criticism, his treatments were now embraced by the medical community.

Ringer's solution contained saline, with combinations of potassium, calcium and lactate. If we look at the following table, which compares the earlier solutions of Stevens, O'Shaughnessy and Latta with Ringer's solution (and indeed Hartman's) we can see some substantial similarities and differences. Although the intravenous solution in use in hospitals today (which is mostly Hartman's) bears no resemblance to the ingredients of Stevens, O'Shaughnessy and Latta, we can see how the ingredients of the solution changed over time. All substances contain potassium, sodium

³⁹ Sherif Awad et al., 'The History of 0.9% Saline', *Clinical Nutrition* 28 (2008): 179–88.

⁴⁰ *Ibid.*

and carbonate of soda, which accounts for the relative success in each case; on a very basic level, the potassium balances out the sodium chloride, rendering the patient less likely to suffer from elevated blood pressure and renal shock from sudden elevation of sodium in the blood. Ringer’s Solution is still the preferred treatment for cholera.

Table 3: Comparison of all Solutions.

Solution	Ingredients
Stevens	Carbonate of soda, muriate of soda, chlorate of potassium, saline.
O’Shaughnessy	Oxygenated salts of nitrate, or chlorate of potassium.
Latta	Protoxide of nitrogen, muriate of soda, water.
Ringer	Sodium chloride (6g), sodium lactate (300mg), potassium chloride (200mg), calcium (200mg) to 1000ml water.
Hartman	Sodium chloride (6g), sodium Lactate (3.22g), potassium Chloride (400mg), calcium (270mg), to 1000ml water.

While there were many physicians who experimented with various combinations of saline, the purpose of this paper has been to show how prison populations were instrumental in some of the most significant discoveries in intravenous treatment. Bynum suggests that during these epidemics, there was a significant distrust of doctors and physicians,

with many people refusing to go to hospital.⁴¹ A prison population were the ideal captive and controlled population for trialling therapeutics, where continued observation and follow-up treatment was more readily obtainable than in the free population.

Indeed, this was not the first time that prisoners were instrumental in the trial of new therapeutics. In 1721, Maitland trialled his method of cutting the cutis for small pox inoculation on six condemned prisoners in Newgate prison in exchange for their freedom.⁴² In Australia, the use of eucalyptus was trialled on prisoners in the first fleet as an attempt to cure scurvy.⁴³ In the Bermuda convict establishment the use of turpentine was trialled to ‘cure’ yellow fever.⁴⁴ This is not to suggest that the medical practitioners of the day were opportunists, seeking to take advantage of a number of unfortunate captives. Rather, it is more indicative of the influences of clinical medicine (as outlined by Foucault, Jewson and others), wherein patients were instrumental in the production of medical knowledge.⁴⁵ These practices became commonplace in the teaching

⁴¹ Bynum, *Science and the Practice of Medicine in the Nineteenth Century*, 75.

⁴² Edgar Crookshank, *History and Pathology of Vaccination*, vol. 1, (London: Lewis, 1889), 53–4.

⁴³ Warren Rout, ‘Remedies on the Run’, *Australian Heritage*, Autumn 2008, 6.

⁴⁴ Angeline Brasier, ‘Prisoners’ Bodies: Methods and Advances in Convict Medicine’, *Health and History* 12(2), 2010, 18–38.

⁴⁵ See M. Foucault, *The Birth of the Clinic* (London: Tavistock, 1973); and N. Jewson, ‘The Disappearance of the Sick Man from Medical Cosmology, 1770–1870’, *Sociology* 10, 1976, 225–44.

hospitals in London in the early nineteenth century, yet in the cases of the cholera epidemic of 1832, the prison populations of Coldbath-Fields, Chatham and Woolwich were part of that production of medical knowledge. As we have seen, the work of Dr William Stevens was the beginning of a journey of discovery and understanding of human haematology, and part of that journey started with prisoners' veins.