

ORIGINAL ARTICLE

“Heroic” medicine in neurology: A historical perspective

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Abstract

Background and purpose: Repetitive bloodletting, promoting profuse diarrhoea and vomiting, the formation of artificial ulcers, and other aggressive treatment methods based on humoral theory and Brunonian medicine were used for patients with nervous system (NS) diseases until the end of the 19th century. These methods are also termed “heroic” medicine by modern medical historians.

Methods: I analysed doctoral dissertations on the subject of NS diseases, clinical reports from 1806 to 1842 from the Vilnius University clinics, and other primary sources. This study was conducted in the vein of a historical–medical analysis and synthesis of primary sources, using comparative analysis, analogy, descriptive methods, and the method of retrospective diagnosis.

Results: Copious bloodletting, purgatives, leeches, cupping therapy, and other potentially harmful methods were frequently employed as habitual treatments for patients with NS diseases. Calomel was used as a purgative and an anti-inflammatory drug, and acidum borussicum was prescribed for patients with hydrophobia. After analysing three clinical cases, I revealed how principles of desperate, “heroic” medicine were applied to treat severe NS diseases with the “strongest” drugs, described in the scientific literature of the time.

Conclusions: My work was not intended to judge or criticize historical treatment methods but to demonstrate on what contemporary scientific theories they were based. We should not rule out the idea that some aggressive treatment methods used nowadays, although they eradicate or reduce the burden of a NS disease, or even prolong patients' lives, may offer exceptional examples of 21st century “heroic” medicine for future generations.

KEYWORDS

heroic medicine, humoralism, neurology, neurosurgery, nineteenth century history, solidism

INTRODUCTION

According to Lithuanian historian Martynas Jakulis, nothing attracts people, even those who are not peculiarly interested in the history of medicine, more than the experiences of their own and other individuals' diseases. Research into the history of medicine, enriched by the professional considerations of the physicians of the time and

dreadful, macabre descriptions of the presentation of nervous system (NS) diseases and their treatments, which require strong nerves of the reader, forces us to rethink our relationship not only with the past but also with today's evidence-based medicine [1].

Repetitive bloodletting, promoting profuse diarrhoea and vomiting, making artificial ulcers (via cautery and caustics), using skin-blistering therapies (e.g., applying powder of cantharides),

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and other treatment methods were used in Western countries until the end of the 19th century with great confidence, scientific justification, and usually, unlucky outcomes. However, did the term “heroic medicine” exist in the medical terminology of the time? The Canadian medical historian Jacalyn Duffin notes that 19th-century European and North American pharmacopoeias contained drugs that are now considered poisons (mercury, antimony, strychnine, opium, etc.), which, combined with restrictive diets, vicious enemas, and various means of bleeding, can be called “drastic, or heroic” [2]. The American historian Lois N. Magner remarks that vigorous therapeutics, including copious bleeding and massive doses of drugs, were the foundation of the “so-called heroic school of American medicine” at the end of the 18th century [3]. The British medical historian Roy Porter (1946–2002) adds that the first half of the 20th century, stimulated by technical innovations and the experience of two world wars, could be called surgery’s “heroic, knife-happy age,” with operating theatres having become “the high altars of the hospital,” and white-coated surgeons “the high priests of medicine” [4].

Therefore, the term “heroic medicine” appears to be nothing more than a modern medical historian’s construct to represent vigorous therapeutic and surgical approaches, especially of 18th- and 19th-century physicians, who embraced the principles of ancient humoral theory and the philosophy of more recent Brunonian medicine. The first doctrine employed therapeutic regimens designed to assist a patient’s natural healing tendencies by bleeding, purging, and regulating the diet to remove morbid humours [3]. The second doctrine, according to John Brown (1735–1788), a follower of the famous physician William Cullen (1710–1790), understood the basis of good health as a balance between external stimulation and internal excitability. Too much stimulation results in sthenic diseases; too little stimulation increases the risk of asthenic ailments. Suppressants (e.g., a vegetarian diet, moderate bloodletting, inducing vomiting and diarrhoea) were prescribed for sthenic diseases; conversely, stimulants (e.g., eating meat, drinking wine, and opium) were recommended for asthenic ones [5, 6].

Benjamin Rush (1746–1813) and his contemporaries represent the most dramatic aspects of the application of heroic medicine in clinical practice throughout medical history. Rush, physician general in George Washington’s (1732–1799) army and a follower of the Brunonian system of medicine, was born in Philadelphia, studied at the University of Edinburgh, and was later appointed a professor of medicine at the Philadelphia College of Medicine. Modifying Cullen and Brown, Rush believed that febrile diseases resulted from excessive stimulation; therefore, he vigorously bled and purged his patients to “divert the force of the fever to [the bowels], and thereby save the liver and brains from a fatal and dangerous congestion” [7]. Moreover, Rush and his colleagues followed Philadelphia physician William Shippen’s (1712–1801) dictum that “desperate diseases require desperate remedies,” refusing to consider that these desperate remedies might be, in most cases, more dangerous than the disease itself [4, 8].

The Faculty of Medicine at Vilnius University (VU) was founded in 1781 and promoted the natural sciences according to the ideals of

the Age of Enlightenment [9]. During the early 19th century, which was marked by an increased interest in new biological theories and clinical medicine, Johann Peter Frank (1745–1821) and his son, Joseph Frank (1771–1842), both Professors of Clinical Medicine, as well as Andrew Sniadecki (Jędrzej, Andrzej Śniadecki; 1768–1838), Professor of Natural Sciences, and Ludwig Heinrich Bojanus (1776–1827), Professor of Zoology and Comparative Anatomy, lectured at VU; established the VU clinics and Vilnius Medical Society; edited science and culture journals; and published treatises and textbooks on the physiology of the human NS and its diseases [10, 11]. As previous studies have shown [1, 11–13] that the perception and treatment of NS diseases in Vilnius were the same as in other European cities of the time, I will consider the primary sources produced in the Vilnius region to illustrate how the principles of heroic medicine were applied to treating patients with various NS diseases, on what scientific theories these treatment options were based, and what lessons we could learn from the past to understand the present and future.

MATERIALS AND METHODS

I first analysed 14 doctoral dissertations written in Latin on the subject of NS diseases and defended at VU in the first half of the 19th century [14–27]. Then, I turned to the *Consensus Caesareae Societatis Medicae Vilnensis* (Protocols of the Vilnius Medical Society), written in Latin and Polish, and analysed the clinical reports on patients with NS diseases that were recorded from 1806 to 1842 [28, 29]. I also reviewed Joseph Frank’s textbook, *Praxeos Medicae Universae Praecepta... Continens Doctrinam de Morbis Systematis Nervosi in Genere et de iis Cerebri in Specie* (Practical Textbook of General Medicine... Containing the Doctrine of Nervous System Diseases and the Special Diseases of the Cerebrum), written in Latin in Vilnius and published in 1818 in Leipzig [30], as well as his *Mémoires Biographiques* (Biographical Memoirs), written in French [31]. A leading treatise on the physiology of animals and humans in Europe, *Teorya Jestestw Organicznyc* (Theory of Organic Beings) by Andrew Sniadecki, published in Polish in 1804 (first volume), was also included [32, 33]. This study was conducted in the vein of a historical-medical analysis and synthesis of primary sources, as well as using comparative analysis, analogy, descriptive methods, and cautiously [34, 35], retrospective diagnosis.

RESULTS

Caroline N.: A story with a happy ending

Humoralism was the most popular system of medicine in the first half of the 19th century in Vilnius and other European cities. Bloodletting, purgatives, leeches, cupping therapy, and diet adjustments were frequently employed as treatment options (Table 1) for patients with apoplexy [14], myelitis [15], St. Vitus’ dance [16],

TABLE 1 Treatment methods used in 19th-century Vilnius clinics for patients with NS diseases.

Treatment method	Explanation and indications
Acupunctura	Acupuncture (for headache, facial pain)
Auxilium diaeteticum	Recommendations for lifestyle and sleep hygiene (for all NS diseases, sleep disorders)
Balneum	Bathing (for all NS diseases)
Catheter	Catheterization (for spinal cord diseases with urinary retention)
Cauterium, causticus	Used to create artificial ulcers (antiphlogistic treatment for inflammatory NS diseases)
Clyster	Enema (antiphlogistic treatment for inflammatory NS diseases)
Cucurbitulas scarificantes	Cupping therapy (antiphlogistic treatment for inflammatory NS diseases)
Diaeta	Diet (for all NS diseases)
Fomentationes capitis frigidae	Cold compress on the head (for inflammatory NS diseases and apoplexy)
Frictio extremitatum	Limb rubbing (for myelitis)
Frigus, calor	Cold or heat application (for various NS diseases)
Hirudines	Leeches (antiphlogistic treatment, local bloodletting)
Magnetismus animalis	Animal magnetism (for sleep disorders, mental diseases)
Pediluvia	Hot foot baths (antiphlogistic treatment to increase blood flow in the lower extremities and thus decrease it in the head)
Phlebotomia	Bloodletting (antiphlogistic treatment for inflammatory NS diseases and apoplexy)
Trepanatio	Trepanation (for head traumas with extravasation and signs of brain compression)
Vesicatorium	Blistering medicine (antiphlogistic treatment for inflammatory NS diseases)

Abbreviation: NS, nervous system.

epilepsy [17], encephalitis [14, 18], tetanus [19], hydrophobia [20], somnambulism [21], and other NS diseases in VU clinics. The main causes of NS diseases were believed to reside in the solid parts of the human body (according to solidism theory [36]), but bloodletting, purging, and the promotion of sweating were still proposed as the most important therapeutic interventions [30]. However, Joseph Frank warned his students that it was dangerous to rely on any medical system in practice and that “all theories should vanish at the bedside of the sick” [31].

A patient who initially complained of tinnitus and headache and was treated with almost all armamentaria of humoral medicine is worth mentioning here. “Caroline N., fifth time pregnant, robust, black-haired woman with swollen, reddened face, not abusing alcoholic beverages, free of any serious illnesses, came to VU Obstetrics Clinic in 1822, complaining of severe headache, fatigue and tinnitus,” wrote Paulus Mokrzycki (*Podoliensis*, from Podolia) in his doctoral thesis. He and his colleagues agreed that the obvious cause of the patient's symptoms was the congestion of blood in the brain; therefore, they first performed bloodletting. The treatment was successful; her headache diminished, and the woman successfully gave birth to a healthy child. However, she felt a sudden pain in her back and had a seizure for the first time in her life; she turned her head to the left, her eyelids and facial muscles twitched, her lips twisted, foam came out of her mouth, her left arm and left leg stiffened, and her breathing became stertorous. She finally relieved herself and fell into a deep sleep. After the convulsions subsided, the patient vomited and avoided light; her pulse was full and hard. Repetitive bloodletting was performed, together with cupping therapy on her back, and the application of 18 leeches to her neck and temples.

Moreover, calomel and “sweet mercury” were given per os to “excite the bowels.” On the eighth day after childbirth, the woman was discharged home, healthy [17].

Caroline N. presented with both general (headache) and focal (focal seizures, evolving to generalized) neurological signs that may be attributed either to acute symptomatic seizures, the first attack of epilepsy syndrome, venous sinus thrombosis, or even eclampsia. Arterial blood pressure was not measured, nor was the amount of protein in the urine determined at the time, making a fair retrospective diagnosis impossible. However, the chosen treatment methods adhered to the medical knowledge of the time. For example, the English physician Thomas Denman (1733–1815) stated that when the pregnant uterus expands, it compresses the large veins in the abdominal cavity, impairing blood drainage from the brain; the congestion of the blood in the brain was known to cause convulsions [37]. Therefore, bloodletting was not only a logical but also a pathogenetic treatment method in 19th-century physicians' minds. In this story, we can only rejoice that despite the heroic treatment methods applied to Caroline N., she survived. In other words, according to VU professor Jean Emmanuel Gilibert (1741–1814), who was also a proponent of the doctrine of vitalism, sometimes “the human vitality (...) overcomes even mortal dangers” [38].

Heroic medicine for a young, “beautiful and strong” patient

Medicine of chemical and animal origins, herbal and compound medicines were also used for patients with NS diseases in Vilnius clinics

TABLE 2 Medicines of chemical and animal origins, herbal and compound medicines used for patients with NS diseases in 19th-century Vilnius clinics.

	Example	Explanation
Chemical origin	Acidum borussicum	Hydrogen cyanide or prussic acid (for patients with hydrophobia)
	Acidum nitrosum concentratum	Concentrated nitric acid
	Aether	Diethyl ether (used as a stimulant for asthenic NS diseases)
	Aqua Goulardi, saccharum Saturni	Salt of Saturn, Goulard's powder: lead acetate
	Calomel, mercurius dulcis	Mercury chloride, calomel (to increase resorption, as a laxative, for inflammatory NS diseases)
	Elixir acido Halleri	Haller's acid elixir: sulphuric acid and alcohol
	Nitras potassae	Potassium nitrate
	Sal amarum, magnesia sulphas	Magnesium sulphate
	Tartarus vitriolatus	Potassium sulphate
	Vitriolum	Sulphuric acid, sulphates
Animal origin	Ambra	Ambergris: produced in sperm whales' digestive systems (used as an aphrodisiac)
	Cantharides	Cantharidin powder (antiphlogistic treatment for inflammatory NS diseases)
	Castoreum	From the castor sacs of beavers (used as a stimulant for asthenic NS diseases and as an aphrodisiac)
	Fel tauri inspissatum	Thickened bovine bile
	Moschus	Musk: from a gland of the musk deer (stimulant)
	Oxymellis simplex	Oxymel: mixture of honey and vinegar (expectorant, part of the diet regimen for various NS diseases)
Herbal medicine	Aqua rubi idaei	Raspberry [leaf] water (anti-inflammatory)
	Asa foetida	Asafoetida (stimulant)
	Belladonna	Atropa belladonna (anti-inflammatory, muscle relaxant, analgesic)
	Camphora	Camphor (stimulant, analgesic)
	Cortex cinchonae peruviani	Peruvian bark (anti-inflammatory, stimulant)
	Digitalis purpurea	Foxglove (diuretic)
	Nicotiana	Tobacco (laxative, hypnotic)
	Nux vomica	Nux vomica, poison nut (stimulant)
	Radix cephaelidis ipecacuanhae	Root of ipecacuanha (expectorant, emetic)
Radix rhei	Rhubarb root (laxative)	
Compound medicine	Aqua Pyrmontana	Carbonated water, sodium chloride, magnesium sulphate, and iron oxide
	Cremor tartari	Tartaric salt: boric salts and potassium tartrate (laxative, diuretic)
	Decoctum Pollini	Decoction of sarsaparilla, guava, and antimony
	Decoctum Zittmani	Decoction of sarsaparilla, mixed with mercury salts
	Laudanum liquidum Sydenhami	Sydenham's laudanum, composed of opium, saffron, cinnamon, cloves, and wine (analgesic, hypnotic, diarrhoea and cough suppressant)
	Pulvis Doveri	Ipecacuanha and opium (to increase sweating)
	Pulvis epilepticus	Crushed elk hooves, human skull, powder of white amber and emerald, myrrh, cinnabar, valerian root, sugar, and other ingredients
	Tartarus stibii et potassae, tartarus emeticus	Emetic tartar: composed of antimony and potassium tartrate

Abbreviation: NS, nervous system.

and elsewhere (Table 2) [28, 29]. Opium tincture was used as an analgesic and hypnotic, and calomel (mercury [I] chloride) as a purgative and anti-inflammatory drug; Peruvian bark (a source of quinine) was prescribed as an anti-inflammatory drug for treating NS diseases and various fevers [14]. The use of acidum borussicum (hydrocyanic

acid) for a patient with hydrophobia exemplifies desperate, "heroic" medicine in treating a fatal illness.

Carolus Wilhelmus Meyer (*Lituanus*, Lithuanian) in his doctoral thesis (Figure 1) described a 20-year-old servant of medium height, a beautiful, strong young man, whose finger in his left hand was bitten

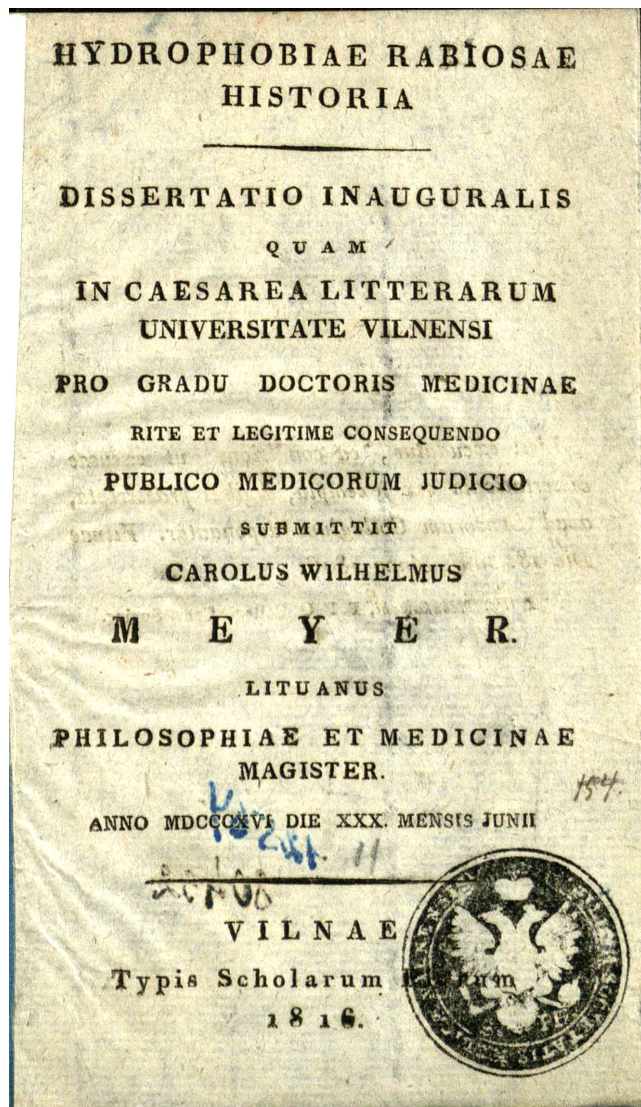


FIGURE 1 Title page of the inaugural dissertation on hydrophobia with Vilnius Medical Society stamp. From Meyer, Carolus Wilhelmus. *Hydrophobiae rabiosae historia. Dissertatio inauguralis*. Vilnae: Typis Scholarum Piarum; 1816. Wroblewski Library of the Lithuanian Academy of Sciences. Used with permission.

by a dog some months previously. The animal was “sick”; the dog’s tail was lowered between its legs, its eyes were red, and it was loudly barking. The patient initially felt general weakness, a lack of appetite, tinnitus, shivers, then numbness in the left arm, fever, thirst, insomnia, and finally, the cardinal symptom of the disease: hydrophobia. Meyer and his colleagues confirmed that the unquestionable cause of the disease was “the effect of the specific contagion to the nervous system,” that is, the effect of “a poison (*virus*).” The physicians diagnosed hydrophobia rabiosa, cut out the scar of the affected finger, and soaked the wound with cantharidin powder to promote suppuration and increase the removal of corrupt humours. They also performed copious and repetitive bloodletting, gave the patient several enemas, applied mercury ointment on his skin, gave some opium tincture to relieve his agitation and pain, and applied leeches for

local bloodletting. Lastly, Meyer decided that prussic acid (*acidum borussicum*), which was described in the scientific literature of the time as a strong new drug for patients with hydrophobia, could be effective in this case. After drinking “a small dose of prussic acid,” the patient felt better. He swallowed food and water more easily, but after a few hours, he felt pressure on his chest, nausea, anxiety, thirst, and again, hydrophobia. The young man feared dying; he was praying to God, so a priest was called, and the patient was anointed, but even the holy water and oils caused whole-body convulsions. The next day, the young patient “released the spirit” [22].

Hydrophobia was considered a fatal disease at the time, caused by a *virus* (meaning “poison” or “venom” in Latin) that was transmitted through the saliva of a rabid animal to the patient’s bitten wound, and, after reaching the NS, caused specific inflammation [20]. The theory of *virus*, acting exclusively on NS was also presented in *Theory of Organic Beings* by Sniadecki, who observed, “Such is also the venom causing rabies, which though enters in terrible combat with the entire organic power, can only regenerate in the salivary glands alone” [32, 33]. Although the Rhabdoviridae infection was not identified at the time (the virological aetiology of rabies and Negri bodies in the central NS were not recognized until 1903), the concept of reservoir and the transmission principles were perceived empirically correctly [39].

The decision to prescribe medicines to the patients of VU clinics was based on the indications of the time; physicians were using drugs that were included in official German and Russian pharmacological literature and described in scientific pharmaceutical journals, and did not seek to kill their patients intentionally. Mercury salts, initially used to treat syphilis since the 16th century, were later believed to be effective for patients with various inflammatory NS diseases, and only in the 20th century it was officially acknowledged that mercury poisoning can cause ataxia, polyneuropathies, myopathies, the loss of peripheral vision, coma, and death [40]. Did the disease or heroic treatment method kill this patient? More than 2 decades after his death, the symptoms of hydrogen cyanide poisoning would be described as similar to those of hydrophobia: increased salivation, pharyngeal irritation, nausea, shortness of breath, headache, fainting, and convulsions [41].

Case of a *parvulus*, or neurosurgery in the 19th century

NS diseases in Vilnius clinics were considered biological and pathological phenomena, and metaphysical interpretations and folk superstitions were neglected in most cases [21]. The cerebral cortex and its functions and focal neurological signs were particularly considered; the importance of brain localization was suggested, associating cortical lesions with seizures and muscular paralysis on a specific side [24, 25]. The brainstem was perceived as a structure that was responsible for the state of consciousness and vital functions [30]. The causes of diseases were associated with macroscopic pathological changes in deceased patients’ internal organs, as well as

the brain. Postmortem examinations of deceased patients were performed to confirm the clinical diagnosis, which was the beginning of the anatomico-clinical method [1] that would be developed to perfection in the second half of the 19th century by Jean-Martin Charcot (1825–1893) and his pupils [42].

Neurosurgical operations were rarely performed in European university clinics and city hospitals at the beginning of the 19th century, because the development of neurosurgery was not possible without major medical discoveries such as anaesthetics and antiseptics, effective haemostasis, and atraumatic surgical techniques; there was scant knowledge of neuroanatomy. However, various operations, including trepanation, the evacuation of epidural or subdural hematomas, and the excision of surface head tumours, were performed in European clinics, including the VU Surgery clinic. When evaluating patients with external head injuries, Vilnius physicians performed a primitive neurological examination and estimated signs of brain compression [25]. Somnolence and stupor, stertorous breathing, and weakness of voluntary movements were evaluated, and the side of hemiplegia was considered one of the most important signs, because trepanation was performed contralaterally to the paralysis [26].

Although Vilnius physicians and surgeons were cautious, and the heart, the brain, and other internal organs were relatively terra incognita for them, I can still find various “heroic” neurosurgery examples in our primary sources. One of them deserves special mention. “A woman from a village brought her 15-week-old boy to VU Surgery clinic,” wrote Basilius Woyciechowski (*Vitebsciensis*, from Vitebsk) in his doctoral thesis. “The little one (*parvulus*) was very thin, a tumour of the size of a duck’s egg was observed at the back of his head, in the region of the occipital fontanelle.” After evaluating the signs and symptoms, physicians did not hesitate to diagnose partial external hydrocephalus (Figure 2), complicated by encephalocele. “The patient’s vital signs were stable... so we punctured the tumour and removed a total of 7 ounces of greenish fluid. During this procedure, the baby fainted, later convulsions appeared... The next day, the little patient (*aegrotulus*) died.” A postmortem examination revealed that the hernia sac comprised three layers: the skin was fused with the dura mater, the pia mater and arachnoidea were swollen with fluid, and the third layer was composed of convolutions of the brain. “The brain was anomalous, so we dipped it in some spirit of wine and took the specimen to the Pathology Museum” [27]. Unusually for doctoral theses of the time, Woyciechowski criticized this surgical approach and used the *parvulus* case to warn future physicians. Although the cerebrospinal fluid of the little patient was, speaking in modern terms, purulent (greenish), the author emphasized that hernia of the brain is a life-threatening condition with a bad prognosis in most cases. “If the hernia is small, it will shrink on its own (...) Surgical treatment, as we have shown before, is fatal” [27]. The autopsy of the deceased patient confirmed the clinical diagnosis, but the specimen did not survive to the modern day; as many students supported the ideals of the Polish and Lithuanian national uprising of 1831, Russian imperial authorities closed VU in 1832, and the Faculty of Medicine 10 years later; the large collection of the Pathology Museum was scattered and lost [9].



FIGURE 2 Illustration of deceased patients with chronic hydrocephalus: body morphology and bone structures. From Derszkoff, Felicianus. *Dissertatio inauguralis medico-practica de hydrocephalo chronico*. Vilnae: Typis A. Marcynowski, 1819. Vilnius University Library, Rare Book Department. Used with permission.

DISCUSSION AND CONCLUSIONS

I have always believed that knowing and understanding history in general, and the history of medicine in particular, are inherently valuable. In the words of Friedrich Nietzsche (1844–1900), “History belongs (...) to the man who preserves and honours, to the person who with faith and love looks back in the direction from which he has come, where he has been. Through this reverence he, as it were, gives thanks for his existence” [43]. Even so, what can these three cases, and many others, hidden in the cellars of university libraries, no longer used, and no longer considered valid, teach us today?

First, I realized that professors and medical students in 19th-century clinics delved into both the physical and psychic (or spiritual) selves of the sick. Perhaps, given their limited diagnostic tools, they considered even the smallest details and clues that could lead to a correct diagnosis relevant. Perhaps the body of the patient was perceived not only as a laboratory of organic processes but also as the seat of a thinking soul. Although modern, evidence-based medicine officially declares adherence to the biopsychosocial model [44], it is almost impossible to apply this in daily clinical practice in neurology and other branches of clinical medicine.

In other words, 19th-century physicians had almost nothing—only their hands, a uroscopy flask, and in rare cases, a primitive stethoscope (the reflex hammer had not yet been invented)—but much time to be present with the sick and to listen to the patient. Today, we have everything—complex laboratory tests, computed tomography, magnetic resonance, nuclear imaging, electroencephalography, sleep and nerve conduction studies—yet we lack the most important element: time for our patients. This additional time for the sick and suffering could be terribly important, something simultaneously old and new, that we could retrieve from the past. Could that be possible? Turning the provision of medical care into a computerized conveyor belt, calculating the “optimal” duration of hospitalization for stroke patients, rehabilitation day quotas for patients with multiple sclerosis, and duration of outpatient neurology consultation services are only some of the weaknesses of the modern health care system.

Second, although Rush and his colleagues were convinced of the correctness of their scientific medical theories, they attributed each instance of improvement to the efficacy of their treatment and each death to the severity of the disease [8]. Our situation is different. Today, we rely on evidence-based medicine, which uses the scientific method to organize and apply data, to improve health care decisions by integrating clinical expertise, patients' values, and the best available evidence [45, 46]. Nonetheless, do we not tremble when our patient with multiple sclerosis gets progressive multifocal leukoencephalopathy while receiving our prescribed disease-modifying treatment? When a thrombolysed stroke patient develops symptomatic intracerebral haemorrhage or a patient with epilepsy develops Stevens–Johnson syndrome, while taking our prescribed best antiepileptic drug, “starting low and getting slow”? When we observe terrible motor fluctuations and dyskinesias in a patient with Parkinson's disease, or address severe augmentation phenomena for those with restless legs syndrome? When we realize that our patient with insomnia has become addicted to hypnotics despite our precautions? When a patient with drug-resistant trigeminal neuralgia, who was sent for neurosurgery, finally experiences a postoperative brainstem stroke?

The purpose of my work is not to judge or criticize historical or current treatments but to try to show what methods were used and on what scientific theories of the time they were based. We should not rule out the idea that some more or less aggressive treatment methods used nowadays, such as extensive neurosurgery, chemotherapy, and biological therapy in general and for patients with NS diseases in particular, although they eradicate or reduce the burden of a disease and prolong or improve the quality of patients' lives, may become examples of 21st-century “heroic” medicine to future generations.

I hope they will also know that we believed in the current theory of medicine, that it was the best possible theory of medicine of our time, and that we sought to do the best for our patients.

AUTHOR CONTRIBUTIONS

Eglė Sakalauskaitė-Juodeikienė: Conceptualization; investigation; writing – original draft; methodology; validation; visualization; writing – review and editing; formal analysis; project administration; resources; data curation; supervision.


CONFLICT OF INTEREST STATEMENT

There are no financial or other conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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