

## Death in the White House: President William Henry Harrison's Atypical Pneumonia

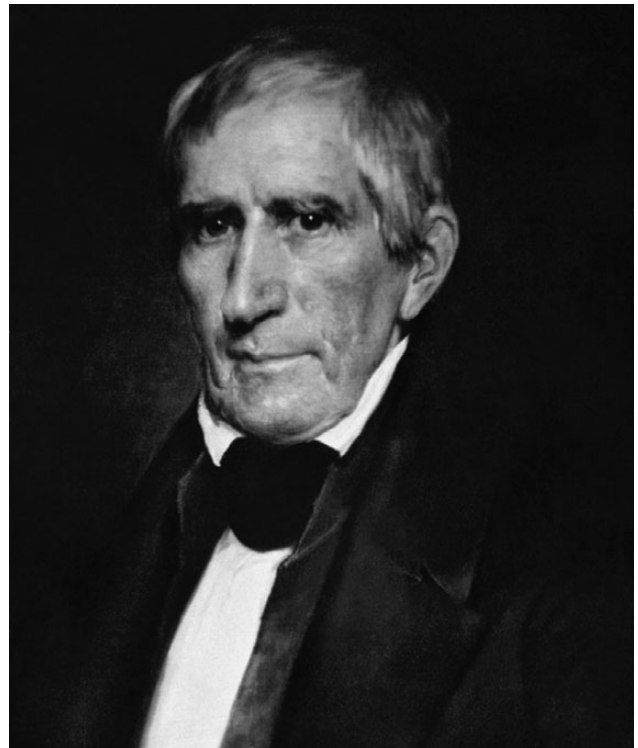
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Historians have long maintained that pneumonia killed William Henry Harrison (1773–1841) just 1 month after he became the ninth president of the United States. For more than a century and a half, it has been alleged that the aged Harrison caught a fatal chill the day he was sworn into office while delivering an overly long inaugural address in wet, freezing weather without a hat, overcoat, and gloves. However, a careful review of the detailed case summary written by his personal physician suggests that enteric fever, not pneumonia *per se*, was the disorder that carried off “Old Tippecanoe.” Two other presidents of that era, James Knox Polk and Zachary Taylor, also developed severe gastroenteritis while in office. Taylor’s illness, like Harrison’s, proved fatal. In all 3 cases, the illnesses were likely a consequence of the unsanitary conditions that existed in the nation’s capital during most of the nineteenth century.

**Keywords.** enteric fever; President Harrison; pneumonia; typhoid.

William Henry Harrison (Figure 1) was 68 years old when he became president of the United States and the oldest US president until Ronald Reagan was elected nearly a century and a half later [1]. He was sworn into office on 4 March 1841. Exactly 1 month later he was dead. Since his death, it has been taken for granted by even the most eminent presidential historians that an overly long inaugural address delivered in freezing weather without a hat, overcoat, and gloves led to a fatal case of pneumonia [2–8]. Fatal pneumonia, however, is a diagnosis in many



**Figure 1.** Early (circa 1850) photographic copy of an 1841 daguerreotype of President William Henry Harrison.

respects at odds with the detailed description of Harrison’s final illness left by his personal physician, Dr Thomas Miller of Washington, DC [9]. Harrison’s illness, like those suffered by 2 of his successors, James Knox Polk and Zachary Taylor, had characteristics more consistent with enteric fever than pneumonia. Moreover, poor sanitation in the nation’s capital during much of the nineteenth century, rather than exposure to inclement weather 3 weeks prior to becoming ill, was likely responsible for Harrison’s fatal illness.

### CASE SUMMARY

According to Miller, President Harrison first consulted him on 26 March (3 weeks after his inauguration) because of several days of anxiety and fatigue, ostensibly due to the intense physical and mental pressures of a hard-fought campaign and the stress of his first weeks in office. He told Miller that he felt unwell but expected to recover soon with the help of a regimen of

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fasting and medicine (of uncertain composition). He also told Miller that he had a long history of “neuralgia, affecting his head, stomach and often his extremities,” in addition to chronic dyspepsia, which he had learned to control with a diet consisting principally of “animal food.” His recent fast, he said, had caused a minor flare of his old dyspepsia. Miller advised Harrison to go to bed and on returning later that evening, found him claiming to be feeling better than he had in days.

At 1:00 PM the next day, Miller was again summoned to the White House, this time because of a severe chill, for which Miller applied a mustard to the president’s stomach and prescribed warm drinks along with a gentle diaphoretic draught, tartar emetic (antimony potassium tartrate), with *spiritus Mindereri* (acetate of ammonia). These induced slight perspiration. When seen again at 5:00 PM, Harrison was “much improved; his skin warm and moist, his thirst allayed. . . his pulse was soft, about seventy-five.” He complained only of a slight pain over his right eye. Because Harrison’s bowels had not moved for 2 days, Miller ordered *Mars Hydrarg* (a mercury-containing compound) and *Ex. Colocynth Comp* (a bitter apple laxative) to be taken at bedtime.

Shortly after midnight the next day, the president developed a violent pain over his right brow and in his right side. The pain in his side, which he attributed to his continued constipation, was accentuated by deep inspiration and motion but not by pressure. When seen by Miller, he also complained of thirst and occasional nausea; his pulse was 80 and soft. Miller ordered enemas, mustard plasters applied to the painful side, and a *Seidlitz powder* (a tartaric acid/sodium bicarbonate/potassium tartrate laxative).

The president’s discomfort began to ease at 8:30 AM, and by 10:00 AM the pain in his side and head had nearly resolved. Because the enemas had produced only small, offensive, fluid evacuations with a few lumps of indurated feces, Miller ordered more *Mars Hydrarg*, along with *Pulv. Rhei* (a rhubarb, ginger, and magnesium oxide laxative) and camphor. He left directions for cups to be applied to the president’s side if his pain returned. At half past 11, Harrison was restless and would not allow his side to be touched.

Harrison was chilly at noon and asked for laudanum (tincture of opium) to be applied to his painful right side. Miller gave him a second laxative pill, which induced only a small discharge of black, fetid water. At 2:30 PM, Harrison’s skin was warmer and drier than it had been; his pulse somewhat faster; his breathing more hurried; and his face a little flushed. Upon examining him, Miller “was satisfied that the lower lobe of the right lung was the seat of pneumonia, complicated by congestion of the liver.” Because Harrison now complained of feeling nauseated and faint, Miller decided not to bleed him, as was the standard treatment for pneumonia, and continued the cups instead.

At 3:00 PM Miller applied a blistering preparation to Harrison’s right side and gave him 20 drops of laudanum, along with

another laxative pill. These relieved the president’s pain but not his constipation. Miller gave him 5 grains of calomel (mercury chloride) with 10 drops of laudanum, which quieted Harrison’s stomach, relieved his pain, and put him to sleep.

The president spent that night troubled by dyspnea and a slight dry cough. He was urinating freely but passed only several small black and fetid stools in response to 2 more laxative pills and 3 grains of calomel. His pulse was 80 and soft. The pain in his side was now mild and dull in character. Miller ordered *Dover’s powder* (ipecac plus opium) to allay Harrison’s restlessness and a small dose of castor oil for his persistent constipation.

When examined at 2:00 PM, Harrison was breathing heavily and coughing occasionally without expectorating. He had had a dark fluid bowel movement in spite of failing to take the castor oil ordered by Miller. He was producing small quantities of concentrated urine. Though febrile, his pulse was only 90 beats per minute. Miller ordered more *Mars Hydrarg*, along with antimony and ipecac. That evening Harrison began expectorating “pinkish mucus.”

Following a comfortable night, the president seemed to be improving, though he remained constipated and distended. Miller gave him more *Mars Hydrarg* and ipecac, along with opium camphor and *Pulv. Rhei*. That afternoon, Harrison was again febrile with a pulse of 85 and most comfortable lying on his right side. By 7:00 PM he had had several bowel movements, voluminous and debilitating enough that Miller felt obliged to order more *Mars Hydrarg*, ipecac, and camphor, together with opium.

The next day (31 March) Harrison was having fewer bowel movements. His cough, though no more frequent, was now producing copious yellow mucus tinged with blood. Miller discontinued the laxative pills and ordered *serpentaria* (Virginia snake weed root) and *seneka* (*Polygala senega*) enemas. When Harrison’s fever returned later in the day, Miller reinstated alternating doses of *Mars Hydrarg*, ipecac, antimony, and spirits of ammonia every 3 hours.

Because Harrison looked worse on the morning of 1 April, Miller decided to discontinue all medicines temporarily, except for *Mars Hydrarg*, which he applied “over the whole abdomen and blistered surface.” That afternoon, Harrison was incoherent, “muttering while dozing; picking at the bed clothes.” A small green bowel movement in the morning gave way later in the day to frequent discharges. Miller applied blisters to the inside of Harrison’s thighs, which seemed to sooth him.

Dr N. W. Worthington of Georgetown and Dr J. C. Hall of Washington City joined Miller as consultants. “After a minute examination . . . they perfectly agreed with [Miller], both in their opinion of the character of the case, and in the propriety of the treatment.” The group decided “to continue the *serpentaria* and *seneka* infusion [ie, enema], with the addition of a few drops of the aromatic spirits of ammonia to each dose.”

Harrison continued to complain of intermittent pain in his side and over his right brow, which were relieved by warm poultices over the blistered surface and *Granville's lotion* along the spine. A new complaint, soreness of his gastrocnemius muscle, responded promptly to massage. *Mars Hydrarg*, camphor, and opium were administered sequentially every 2 hours.

On the morning of 2 April, Harrison was expectorating brownish mucus tinged with blood. Miller gave him 2 grains of *blue mass* (another mercury-containing medication) every 2 hours while continuing the *serpentaria* and *seneka* enemas. These induced several small, brownish, watery bowel movements initially and then another “copious evacuation.”

The president slept fitfully but was perfectly lucid when aroused. His cough, now dry and hacking, “was relieved by a teaspoonful of *squill* (*Scilla maritima* root, used as an expectorant, diuretic, emetic, and purgative), *morphia*, and *Tolu* (cough syrup), in equal quantities.” He appeared flushed and was warm to the touch. His pulse was quicker than it had been.

At 2:30 PM the president passed a very large and feculent stool, which left him “feeble and languid.” Miller gave him “twenty drops of laudanum to check an inclination to another passage.” However, the watery diarrhea simply increased in intensity, and Harrison became progressively more lethargic and difficult to arouse. His pulse was “slow, hobbling and intermittent, [his] skin dark and muddy,” his abdomen distended. Miller ordered stimulants, mustard plasters applied to the extremities and abdomen, along with starch, laudanum, a *kino* (dark red dried juice of certain plants used for tanning and drying) enema, spirit of turpentine sponging, and camphor and carbonate of ammonia emulsion with a hot brandy toddy. By then, Harrison’s “pulse [was] sinking; extremities blue and cold.”

At 8:45 PM on 3 April 1841, President William Henry Harrison uttered his last words, “Sir, I wish you to understand the true principles of government; I wish them carried out, I ask nothing more.” At half past midnight on 4 April, “without a groan or a struggle, he ceased to breath.”

## DIFFERENTIAL DIAGNOSIS

In the nearly 2 centuries since Harrison’s death, Miller’s diagnosis has not been challenged. Biographies, history books, and periodicals have consistently maintained that pneumonia was the disorder that carried off America’s ninth president just a month after being sworn into office [2–8]. Interestingly, Miller himself seems not to have been entirely comfortable with the diagnosis. In response to intense pressure from a stunned public to provide an explanation for the loss of their newly elected leader, he gave them pneumonia as his answer, though with obvious reservations. “The disease was not viewed as a case of pure pneumonia [he wrote]; but as this was the most palpable affection, the term pneumonia afforded a succinct and intelligible

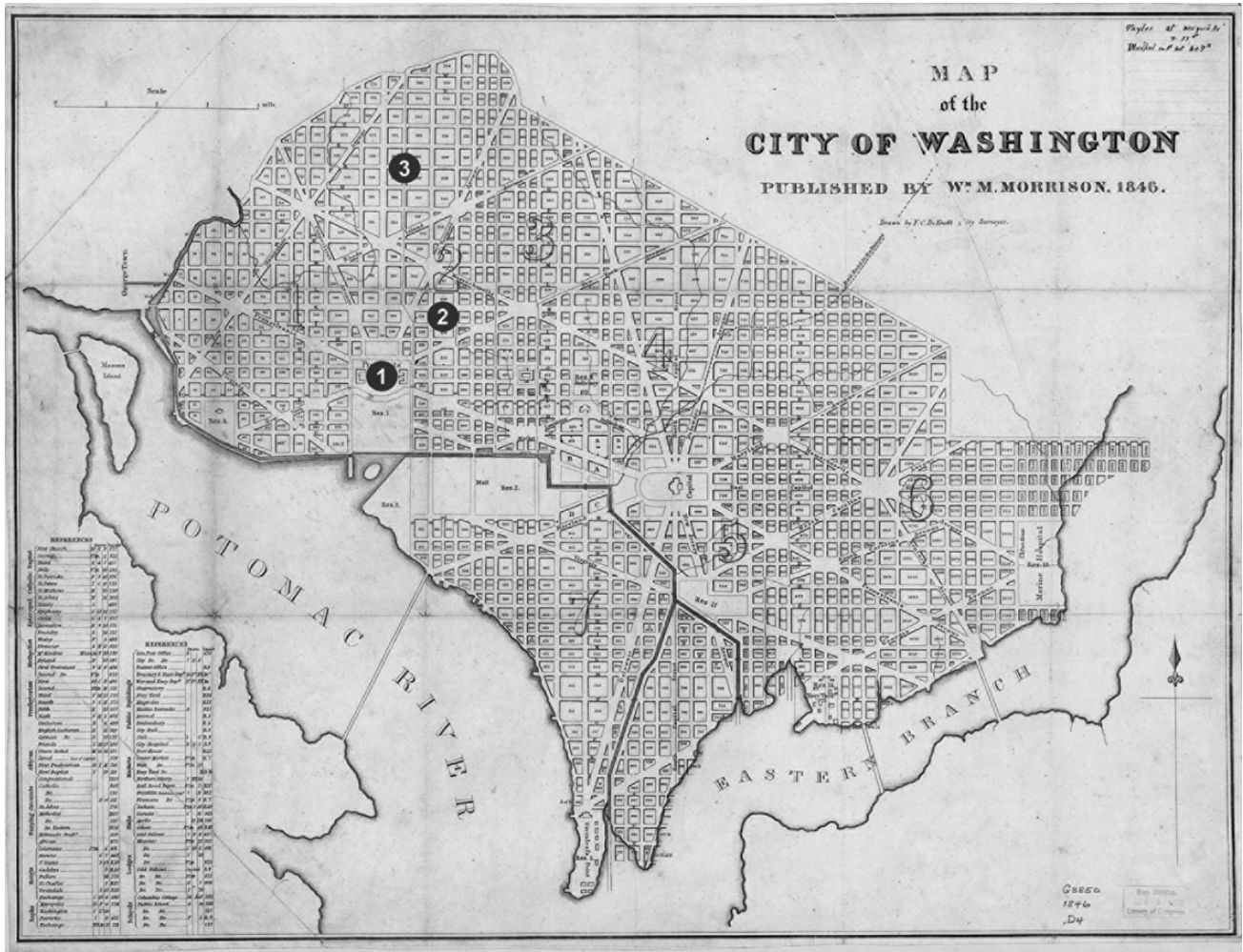
answer to the innumerable questions as to the nature of the attack” [9].

Miller had good reason to be uncomfortable with pneumonia as Harrison’s principal diagnosis. Although the president had fever, dyspnea, and cough productive of blood-tinged sputum during the course of his illness, his pulmonary symptoms didn’t arise until the fifth day of his illness and were intermittent rather than progressive thereafter. His gastrointestinal complaints, by comparison, began on the third day of the illness and were relentless as well as progressive. They began with constipation and abdominal distension that persisted for 5 days in spite of repeated laxatives and enemas administered by Dr Miller. On the sixth day of the illness, Harrison’s bowels finally opened (possibly in response to Miller’s laxatives but just as likely due to progression of the gastrointestinal disorder), producing a flood of “foetid,” watery diarrhea; a sinking pulse; cold blue extremities; and, ultimately, death.

The etiology of Harrison’s intermittent pain in the right side also confused Miller, who seems to have vacillated between a pulmonary and a hepatic cause. On examining Harrison on the afternoon of 28 March, he reported that he “was satisfied that the lower lobe of the right lung was the seat of pneumonia.” However, he then equivocated by adding “complicated by congestion of the liver.” Unfortunately, he didn’t give the physical findings upon which he based his conclusion. Nor did his description of the pain clarify the site from which it arose. On the one hand, he says it was “intermittent, equally increased by deep inspiration but not pressure,” suggesting that it was pleuritic. On the other, he describes it as “persistent . . . mild and dull in character” and apparently also accompanied by enough tenderness that Harrison “objected to all local applications to his side,” supporting his suspicion that “congestion of the liver” (ie, an edematous and painful liver) was its cause.

Thus, although Harrison’s lungs were one of the targets of the infection that took his life (as evidenced by his intermittent cough and 2 episodes of slight hemoptysis), his pulmonary symptoms were not as severe as his gastrointestinal distress, nor were they progressive. Given the dominance of Harrison’s gastrointestinal signs and symptoms, it is more likely that he died of a gastrointestinal infection—in particular, enteric fever—with secondary involvement of the lungs than of a pulmonary infection with secondary involvement of the liver and intestine.

All of Harrison’s signs and symptoms, in fact, were typical of “enteric fever,” a severe systemic illness caused by disseminated infection with *Salmonella typhi* or *S. paratyphi* [10]. Fever and abdominal pain, 2 of the most consistent complaints of patients with enteric fever, are present initially in 75% and approximately 40% of cases, respectively. Constipation and diarrhea occur with equal frequency, with 10% to 40% of patients having 1 or both



**Figure 2.** An 1846 map of Washington, DC, showing the locations of the “President’s House” (1) (approximate elevation 55 feet), the springs from which it received its water supply (2) (approximate elevation 60 feet), and the field in which night soil collected each day from city residents was deposited (3) (approximate elevation 80 feet). Approximate elevations are from the DC Geographic Information System.

complaints. The diarrheal stool of typhoid patients has been described as particularly foul smelling (ie, “foetid”) and having the consistency of pea soup [11]. Nonspecific symptoms, for example, Harrison’s chills, frontal headache, anorexia, cough, and muscle pain, are common. Respiratory symptoms, in fact, are so prominent in typhoid fever patients that a respiratory origin for their fever is often suspected. Hepatitis (a potential cause of Harrison’s “congested liver”) occurs but is a less common complication of enteric fever. Gastrointestinal bleeding (a potential explanation for the black stools Harrison passed on 28 March and 29 March) develops in 10% to 20% of untreated cases as a result of hyperplasia, ulceration, and necrosis of Peyer’s patches (another potential cause of Harrison’s flank pain) in response to invasion by *S. typhi* or *S. paratyphi*. The relative bradycardia exhibited by Harrison throughout the course of his fatal illness,

although nonspecific, has long been regarded as a hallmark of enteric fever. Nearly half of such patients exhibit relative bradycardia, with those infected by *S. paratyphi* doing so more often than those infected by *S. typhi* [12].

There is ample reason to conclude that Harrison’s move into the White House placed him at particular risk of contracting enteric fever. In 1841 the nation’s capital had no sewer system (nor, for that matter, did any other American city). Until 1850 sewage from nearby buildings simply flowed onto public grounds a short distance from the White House, where it stagnated and formed a marsh. The White House water supply, which came from springs in the square bounded by 13th, 14th, I, and K streets NW, was situated just 7 blocks below a depository for night soil that was hauled there each day from the city at government expense (Figure 2) [13]. This might explain

why 3 antebellum US presidents, Harrison, James Polk [14], and Zachary Taylor [15], each developed severe gastroenteritis while residing in the White House. Polk recovered only to die of presumed cholera 3 months after leaving office. Taylor, like Harrison, succumbed to his episode of gastroenteritis while president.

Harrison's history of "dyspepsia" also potentially heightened his risk of infection by enteropathogenic bacteria that might have found their way from Washington's night soil depository into the White House water supply. Although we have no record of the specific treatment he used to manage his attacks of dyspepsia, "carbonated alkali" was the standard treatment for dyspepsia in 1841 [16]; a diet "consisting principally of animal food," that is, Harrison's diet, was also recommended as prophylaxis [17]. Many years later, it was shown that when the gastric acid barrier is neutralized by antacids such as "carbonated alkali," bacterial pathogens normally killed by gastric acid are able to survive passage through the stomach into the lower intestine where they invade the host. In the absence of the gastric acid barrier, inocula of enteropathogenic bacteria required to cause gastroenteritis are greatly reduced, sometimes by as much as 10 000-fold [18].

In 1841 there was no effective treatment for enteric fever. At that time, the most a physician could do for a patient with typhoid or paratyphoid fever was to adhere steadfastly to medicine's most sacred tenet, *primum non nocere*—first do no harm. Miller did so to the extent that he elected not to bleed Harrison, as was the standard treatment for pneumonia at that time [4]. Although the myriad medications he gave Harrison during the course of his final illness were standard of care for that time, many are now recognized as overtly toxic. They included a considerable amount of mercury, and yet, Harrison apparently never exhibited obvious signs of mercury intoxication (eg, tachycardia, diaphoresis, sialorrhoea) during his illness. If he had enteric fever, as his case history suggests, the opium that Miller gave him was especially dangerous and might have converted a serious illness into a fatal one. Bowel motility has an important role in ridding the host of intestinal pathogens. Inhibition of peristalsis by drugs such as opium promotes not just the retention of enteropathogenic bacteria like *S. typhi* and *S. paratyphi* but also facilitates their invasion into the bloodstream [18]. Enemas are also potentially dangerous in such patients because they can cause an inflamed terminal ileum to perforate. Given Harrison's sinking pulse and cold blue extremities at the time of his death, most likely he succumbed to septic shock, possibly resulting from a perforated terminal ileum.

## EPILOGUE

If Harrison had survived long enough to serve out his term as president, the course of US history might have been altered in

2 important ways. First, as a mainstream Whig politician, Harrison likely would have supported a controversial Whig measure to charter a national bank [19]. His successor, Democrat-turned-Whig John Tyler, vetoed the measure, possibly preventing the creation of an American equivalent of the Bank of England, which would have rendered moot the Federal Reserve established just prior to World War I.

Second, unlike his successor, Harrison would not likely have instigated passage of the Congressional resolution to annex Texas in 1844, which precipitated the Mexican War just 2 years later [20]. Following the US victory, passionate disputes erupted between North and South over the expansion of slavery into the vast territories taken from Mexico—disputes that would not be settled until the American Civil War of 1861–1865. Had Harrison lived to complete his presidency, the Mexican War might have been delayed and the Civil War pushed further forward in time. What effect this would have had on the war and its outcome is impossible to know.

## Notes

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**Potential conflicts of interest.** Both authors: No reported conflicts.

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