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Résumé de l'article

Le registre de l'Hôpital de Fort Wellington contient les cas cliniques de 278 soldats traités par les officiers médicaux dans une garnison britannique pendant les années 1840. Une analyse à l'aide de l'ordinateur nous donne des renseignements sur les maladies et les traitements et nous permet d'étudier les soldats et leurs médecins comme travailleurs. Les soldats souffraient souvent des conditions de travail — situation étiologique que leurs médecins ont quelquefois bien appréciée. Ce projet nous mène à l'idée épistémologique que les noms des maladies choisis par les médecins étaient influencés par leurs relations de travail avec leurs soldats-patients et avec leurs officiers supérieurs dans un contexte militaire.

Soldiers' Work; Soldiers' Health: Morbidity, Mortality, and their Causes in an 1840s British Garrison in Canada

Jacalyn Duffin

MILITARY PERSONNEL of the early 19th century do not have a prominent place in labour history; nor have they been given much attention in the medical history of occupational health. Classification of soldiers as workers is awkward (if justifiable), partly because their work can be construed as the instrument of a ruling elite or a paternalistic boss. Yet during the period up to and including the 1840s, British soldiers and militia men were occupied with civilian public works, such as road and canal building — works that by their effect on economic activities contributed to the later emergence of class distinctions and the resultant labour movement.¹ Notwithstanding the lodgings, with wages of 1s/1d a day, soldiers may have been among the least remunerated of all labourers in early 19th-century Canada.²

¹H. Clare Pentland, *Labour and Capital in Canada, 1650-1860* (Toronto 1981), 48-54, esp. 52-3. The period 1800-1850 has been characterized as paternalistic, with a lack of a coherent working-class presence; it gave way to a homogenization of labour in the 1850s and 1860s fostered by the advent of urban centres linked by canals, railways, and roads. See Bryan Palmer, "Labour in Nineteenth-Century Canada," in *Lectures in Canadian Labour and Working Class History*, W.J.C. Cherwinski and Gregory S. Kealey, eds. (St. John's 1985), 51-7, esp. 53-4; Bryan Palmer, *Working-Class Experience: Rethinking the History of Canadian Labour, 1800-1991* (Toronto 1992), 41-8. For more on the military involvement in canal construction, see J. Mackay Hitsman, *Safeguarding Canada, 1763-1871* (Toronto 1968), 119-29; George F.G. Stanley, *Canada's Soldiers: The Military History of an Unmilitary People*, 3rd ed. (Toronto 1974); William N.T. Wylie, "Poverty, Distress, and Disease: Labour and the Construction of the Rideau Canal, 1826-1832," *Labour/Le Travailleur*, 11 (Spring 1983), 7-29.

²For soldiers serving abroad, five shillings for rations were "stopped" from the daily wages of 1s/1d. See Hew Strachan, *Wellington's Legacy: The Reform of the British Army, 1830-54*

Jacalyn Duffin, "Soldiers' Work; Soldiers' Health: Morbidity, Mortality, and their Causes in an 1840s British Garrison in Canada," *Labour/Le Travail*, 37 (Spring 1996), 37-80.

Furthermore, the 15 to 20,000 troops in Canada during the early 1840s were active participants in the social and economic life of their communities and had a direct impact on the development of the country.³

From a medical perspective, soldiers have been mentioned in accounts of surgical practice since antiquity.⁴ Medical studies of labourers date from the early modern period, but soldiers were rarely included in them.⁵ Most medical documents that addressed the health of soldiers have focused on wars and battles. With few exceptions, histories of medicine in the military seem to have adopted the same emphasis on conflict, which is often portrayed as an impetus for medical innovation.⁶

(Manchester 1984), 57-8. For some comparisons with other wages of the same period, see Palmer, *Working-Class Experience*, 48-51.

³R. Louis Gentilcore, ed., *Historical Atlas of Canada; II The Land Transformed* (Toronto 1993), Plate 24; Fred Dreyer, "Three Years in the Toronto Garrison: The Story of the Honourable Gilbert Elliot, 1847-1850," *Ontario History*, 57 (1965), 29-38; John Philp, "The Economic and Social Effects of the British Garrison on the Development of Western Upper Canada," *Ontario History*, 41 (1949), 39-50; Richard Preston, "Military Influence on the Development of Canada," in Hector J. Massey, ed., *The Canadian Military: A Profile* (Toronto 1972), 49-85, esp. 56-62; Elinor Kyte Senior, *British Regulars in Montreal: An Imperial Garrison, 1832-1854* (Montréal 1981), 145-205; Brian Osborne and Donald Swainson, *Kingston: Building on the Past* (Westport, ON 1988), 62-3.

⁴Guido Majno, *The Healing Hand: Man and Wound in the Ancient World* (Cambridge, MA 1975).

⁵The first medical treatise devoted solely to the occupational health of a specific labour group is generally held to be the mid-16th-century monograph by Paracelsus on diseases of miners and smelters. Theophrastus von Hohenheim called Paracelsus, "On the Miners' Sickness and Other Miners' Diseases," translated by George Rosen, in *Four Treatises of Theophrastus von Hohenheim called Paracelsus*, Henry E. Sigerist, ed. (Baltimore 1941), 43-126. One exception that did look at soldiers was Bernardino Ramazzini's 1713 treatise on the diseases of workers, including people in military camps. Bernardino Ramazzini, *De Morbis Artificum [Diseases of Workers]*, Latin text of 1713 with English translation by Wilmer Cave Wright (Chicago 1940), 358-75.

⁶See for example the text on camp diseases of the USA Armies written during the Civil War, Joseph Janvier Woodward, *Outlines of the Chief Camp Diseases of the United States Armies* [1863] (New York 1964). This text has been selected for reprinting more recently as part of the twelve-volume series of medical works written during the Civil War, edited by Ira Rutkow, *American Civil War Medical Series* (San Francisco 1990-92). Histories of the British, Canadian, and American army medical services are either devoted solely to wars, or largely organized around them. Neil Cantlie, *A History of the Army Medical Department* (Edinburgh 1974); W.R. Feasby, *Official History of the Canadian Medical Services, 1939-45* (Ottawa 1953-6); Mary C. Gillett, *The Army Medical Department, 1775-1818* (Washington 1981); Graham A. Cosmas and Albert E. Cowdey, *The Medical Department: Medical Service in the European Theater of Operations* (Washington 1992). Even unofficial histories of military medicine, which have examined the development of medical specialties within the military, have studied the changes from a wartime perspective. Richard A. Gabriel and Karen S. Metz, *A History of Military Medicine*, 2 vols. (Westport 1992); Tom Brown,

Only recently has this emphasis been challenged.⁷ With few 19th-century Canadian wars and no tradition in the study of soldiers as peacetime workers, it is not surprising that the health of military men during the last century in this country has received little attention.⁸

Historians of work-related medicine have tended to concentrate on two specific periods of change: the first third of the 19th century, when occupational health became a political and social issue in parallel with industrial changes; and a later period, when workers in Europe and North America began to win important legislative concessions designed to protect them from the hazards of employment.⁹ Many such analyses are case studies of miners or factory workers, especially blacks, women, and children. In Canadian history, occupational health has almost always been treated as an issue of working conditions for the civilian poor.¹⁰

"Shell Shock in the Canadian Expeditionary Force, 1914-1918: Canadian Psychiatry in the Great War," in Charles G. Roland, ed., *Health Disease and Medicine: Essays in Canadian History* (Toronto 1984), 308-32; Terry Copp and Bill McAndrew, *Battle Exhaustion: Soldiers and Psychiatrists in the Canadian Army, 1939-1945* (Montréal 1990); Joel D. Howell, "'Soldier's Heart': The Redefinition of Heart Disease and Specialty Formation in Early Twentieth-Century Great Britain," in William F. Bynum, Christopher Lawrence, and Vivian Nutton, eds., *The Emergence of Modern Cardiology* (London 1985), 34-52. The work of Jay Cassel on the "life and death" of an army takes a longer look at the subject with attention to nutrition, hygiene, and environment through periods of relative peace and war. Jay Cassel, "The Troupes de la Marine in Canada, 1683-1760," PhD Thesis, University of Toronto, 1988. For other exceptions see, Strachan, *Wellington's Legacy*, 53-4, 60-6; Alan Ramsey Skelley, *The Victorian Army at Home: The Recruitment and Terms and Conditions of the British Regular, 1859-1899* (London 1977).

⁷Innovations often described as having been stimulated by war include Ambroise Paré's "discovery" of minimal dressings for gunshot wounds, Baron Larrey's "invention" of the ambulance, surgical procedures for reconstruction, the "chemotherapeutic side-effects" of mustard gas poisoning, and Norman Bethune's development of a plasma transfusion service. For recent criticisms of this trend see, Roger Cooter, "Medicine and the Goodness of War," *Canadian Bulletin of Medical History/Bulletin canadien d'histoire de la médecine*, 7 (1990), 147-60; Beth Haiken, "Plastic Surgery and American Beauty," *Journal of the History of Medicine and Allied Sciences*, 68 (1994), 429-53.

⁸With respect to the 19th century, a notable exception is Wylie's work on the Rideau Canal experience with malaria, but in his study, the role of soldiers was de-emphasized. See Wylie, "Poverty, Distress, and Disease."

⁹See the extensive bibliographies on the history of occupational health (among other topics) prepared by Ed Morman and published in successive numbers of the *Sigerist Circle Newsletter* from Number 2 (Winter 1991) through Number 5 (Spring 1993) edited by Pauline Mazumdar, University of Toronto. Morman tellingly classifies "Occupational Health" as a subdivision of "Class Issues." On Canada, see Eric Tucker, *Administering Danger in the Workplace: The Law and Politics of Occupational Health and Safety Regulation in Ontario, 1850-1914* (Toronto 1990).

¹⁰See for example, Irving Abella and David Millar, eds. *The Canadian Worker in the Twentieth Century* (Toronto 1978), 153-215; and the references indicated in Charles G.

The following essay examines both soldiers and their doctors as workers at a Canadian garrison during a time of relative peace. After a presentation of the personnel, their illnesses, diagnoses, and treatments, the causes of disease will be elucidated, the factors influencing medical practice will be explored, and a few observations will be made about possible reasons for the neglect of the soldier in 19th-century Canadian history.

Fort Wellington and Its Hospital Register: Source and Method

FORT WELLINGTON was a British colonial fort situated at Prescott on the north shore of the St. Lawrence River about 110 kilometres east of Kingston. The first fortifications in the area were established in 1760, but removal to the present site

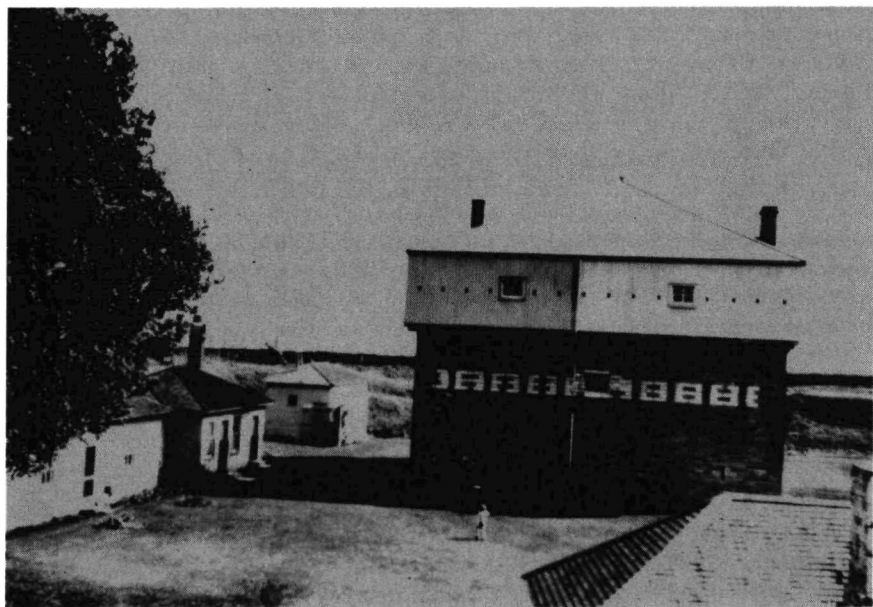


Fig. 1. Fort Wellington with Blockhouse in centre, roof of guard house to the right foreground, and St. Lawrence River in the distance. *Museum photograph provided by Dennis Carter-Edwards, Parks Canada.*

Roland, *Secondary Sources in the History of Canadian Medicine: A Bibliography* (Toronto 1984), 86.

took place in 1812. The garrison gradually declined to the point that it was "put up for sale" because it was "practically useless" and "had virtually to be rebuilt" to meet the need for frontier defences inspired by the 1837 Rebellion.¹¹ The rebuilding was undertaken by the Royal Engineers of Kingston in 1838. The Fort saw military action five times: in 1812, 1838, 1860, 1865, and 1866. Usually less than 100 men occupied the garrison and approximately 30 women and 40 children were also present, but numbers often expanded in times of crisis.¹²



Fig. 2. Reconstruction of crowded living quarters at Fort Wellington (c. 1846). *Photograph by author.*

¹¹ Stanley, *Canada's Soldiers*, 185.

¹² John Douglas, *Medical Topography of Upper Canada* [1819] (Canton, MA 1985), 8; Government of Canada, National and Historic Parks Branch, *Fort Wellington National Historic Park* [pamphlet] (Ottawa 1966); Robert Burns, "Fort Wellington: A Narrative and Structural Study, 1838-1854," Parks Canada, Ontario Region, Cornwall, manuscript on file. On numbers of soldiers stationed at Fort Wellington, see National Archives of Canada (NAC), MG 13, W.O. 17, "Returns of Troops Stationed in Canada, 1843-6." I am indebted to Katherine McKenna for a summary of this material. See Katherine M. J. McKenna, "Family Life in a Military Garrison: History of the Routines and Activities of the Royal Canadian Rifle Regiment at Fort Wellington, Prescott 1843-1854" (Ottawa 1991) Parks Canada, Microfiche Reports Series, forthcoming, 463-4.

Fort Wellington has been administered by Parks Canada since 1923, and has been restored to the period of the mid-1840s. Most of the buildings visible today date from 1838. At the time of writing, the Fort is the subject of extensive historical and archeological investigation: the latrines have been excavated and a number of glass items, some thought to have contained medicines, were found; historical records have been exploited to reconstruct garrison life.¹³ From the perspective of military history at least, "everyday life" is a relatively new topic: writing 30 years ago, one military historian chose to describe it as "trivialities ... which shrewder and more serious minds often ignore."¹⁴

The Fort Wellington Hospital was situated outside the walls of the Fort in a nearby house that was built by 1823.¹⁵ During the War of 1812, the attending surgeon found that the earlier hospital facilities, being subject to the "extremes of heat and cold," were "certainly unfriendly to ... general welfare."¹⁶ After repeated appeals, approval for the outfitting and renovation of a special hospital was finally granted in December 1840.¹⁷ The resultant two-storey building contained a kitchen, three wards with a total capacity of sixteen beds, a surgery, and a room for the hospital sergeant.¹⁸ It served as the Fort Hospital until 1854; it still stands and is privately owned.

The Hospital Register, now preserved at Fort Wellington, provides a day-by-day account of the illnesses, diagnoses, and treatment of 278 soldiers admitted 462 times and attended by at least 4 different medical officers from 27 July 1840 to 3 January 1846. The first few entries antedate the repairs to the new Hospital. The years of the Register were a period of relative calm in the life of the fort, as they

¹³McKenna, "Family Life"; Catherine Sullivan, "Glass and Toiletry Artifacts from the Fort Wellington Latrine," unpublished report, Material Culture Research Division, Canadian Parks Service 1993.

¹⁴Fred Dreyer, "Three Years in the Toronto Garrison." Dreyer's essay is an exception; most military histories have ignored peacetime living conditions of troops in Canada. Dreyer himself seemed to apologize for his own essay which was based on a soldier's diary the content of which, he said, "records little but the details of regimental gossip and a monotonous succession of parades, inspections, and exercises" and could offer only "superficial glimpses into Canadian life." For another prominent historian, the "humanitarian considerations" for soldiers were equated with the "relief" that could be provided most effectively by increased recruiting. C.P. Stacey, *Canada and the British Army: A Study in the Practice of Responsible Government* (Toronto 1963), 52-3.

¹⁵Paul Fortier, "Introduction to the Hospital Register, Fort Wellington National Historic Park," 1987, microfilm, Environment Canada, Parks, FX.86.47. On the policy to construct regimental hospitals, see Strachan, *Wellington's Legacy*, 242-4.

¹⁶Douglas, *Medical Topography*, 33.

¹⁷The estimated cost of repair to the nearly twenty-year-old structure was £58/1s/11d. NAC, W.O. 55, Vol. 1917, 658, 658a, 659; Burns, "Fort Wellington," 73-4.

¹⁸For a contemporary floor plan of the Hospital, see NAC, W.O. 55, Vol. 1917, between 658-9.

fell between the activities related to the Rebellion of 1837-38 and the Fenian Raids and the North West Rebellion of the 1860s. The authors of the Register were military surgeons — workers themselves — whose identities, training, skills, and systems of remuneration have now been traced.

The Register consists of 250 double-paged numbered "folios," which provide the date, age, history, diagnosis, treatment, and a brief account of each patient's illness. Pages are missing for the first sixteen months in 1840-41, but there is an eighteen-page alphabetical index with patient names, diagnoses, and folio number. As a result, some information could be collected about the 69 patients whose detailed records are missing. Other sources for this study include military records held in the National Archives and contemporary medical literature pertaining to the health and treatment of soldiers.

Information concerning all cases was transcribed from the Register into a data-base file. The results, which appear in tabular form throughout this essay, provide information about the number of admissions, the patients, their illnesses, the diagnostic labels applied to the ailments by the attending physicians, and the treatments prescribed. It appears that the Fort Wellington Hospital Register is the first medical record of peacetime soldiers in Canada, if not the Commonwealth, to have been subjected to computer-assisted quantitative analysis.¹⁹

Little information was given in the Register about the presumed causes of disease, except in cases of injury. Nevertheless, analysis of the symptoms, their patterns, and the remedies prescribed allows for a reliable reconstruction of the most important causes of disease. Since the causes of disease must be inferred or derived from the raw data, they will be presented in what might appear to be a counter-intuitive position: after the discussion of the patients, doctors, disease, and treatment.

The Soldiers: As Workers and As Patients

AT FORT WELLINGTON and other garrison towns, soldiers lived in crowded and poorly ventilated barracks, often a dozen or more men to a room where they slept, ate, washed, and urinated.²⁰ The wives of some married soldiers and their children

¹⁹ A report of the analysis including seventeen tables and six detailed appendices has been filed with Parks Canada. Jacalyn Duffin, "Analysis of the Fort Wellington Hospital Register, 1840-1845," 1994. Most of the social history of British soldiers has relied on official reports. See for example, Strachan, *Wellington's Legacy*; Skelley, *Victorian Army*. For a transcription of a physician's diary with tabular information about diseases in each month, see Richard C. Knopf, "A Surgeon's Mate at Fort Defiance: The Journal of Joseph Gardiner Andrews for the Year 1795," *Ohio Historical Quarterly*, 66 (1957), 57-86, 159-86, 238-68.

²⁰ For a vivid account of the conditions at Fort Wellington, see McKenna, "Family Life," esp. 20-56. For more on life in other garrisons see, Claudette Lacelle, *The British Garrison in Quebec City as Described in Newspapers from 1764 to 1840* (Ottawa 1979); Osborne and Swainson, *Kingston*, 62-3; Preston, "Military Life"; Senior, *British Regulars*; Ronald L. Way, "Soldiering at Old Fort Henry," *Canadian Geographical Journal*, 47 (1954), 178-98.

shared the cramped space with only blanket curtains for privacy. Official limits on the number of women sharing barrack space were usually exceeded at Fort Wellington and other families lived in the nearby town.²¹

The daily work of the soldiers during a time of peace was monotonous and physically exacting. The main function of the garrison was defence of the colony from attack by Americans or by rebels. The soldiers were required to drill for long hours daily at regular and special parades, sham fights, and artillery salutes; each man served shifts of guard duty during which his vigilance could be taxed by prolonged inaction, silence, darkness, and cold. The men worked in the kitchens and the garden, and were required to make repairs to the buildings and their uniforms. The garrison could serve a police function by actively maintaining stability in the colony, but more often it did so passively by its presence; soldiers could also work as firefighters.²² Occasionally military men were sent to work on construction projects and road maintenance, but during the period of this study, public works were increasingly left to private contractors.²³ Discipline was harsh and the rate of desertion high. Punishments were notoriously brutal. Men at Fort Henry in nearby Kingston were flogged for drunkenness; indeed, a Parks Canada document tells the story of a soldier who received 229 lashes for falling asleep at his post.²⁴ Public opinion held that all soldiers divided their off duty time between the tavern and the brothel.²⁵

Until the recent work of Katherine McKenna, who has studied the Royal Canadian Rifle Regiment (RCR), little was known about the individuals who served as soldiers at Fort Wellington.²⁶ There were British soldiers, some belonging to the RCR, and locally engaged militia men. The RCR were comprised of older, well-seasoned professionals. Many had been skilled artisans or tradesmen, and they were

²¹ McKenna, "Family Life," 464.

²² For more on the relationship between the military and policing in the colony, see Allan Greer, "The Birth of Police in Canada," in Ian Redforth and Allan Greer, eds., *Colonial Leviathan: State Formation in Mid-Nineteenth-Century Canada* (Toronto 1992), 17-49, esp. 19-20 and 29; Senior, *British Regulars*, 57-76. For more on soldiers as firefighters, see Senior, *British Regulars*, 134-42.

²³ For more on the relationship between the military and private entrepreneurs in public works, see Brian Osborne and Donald Swainson, *The Rideau Navigation, 1832-1972: Its Operation, Maintenance, and Management* (Ottawa 1985) Parks Canada Microfiche Reports Series 191, 30-103.

²⁴ Way, "Soldiering," 178-98; Parks Canada, *British Soldiering in Canada* (Ottawa 1978). Britain's martial laws have been called the "most barbarous" in Europe. See John Laffin, *Tommy Atkins: The Story of an English Soldier* (London 1966), 99-119, esp. 99.

²⁵ Lacelle, *British Garrison in Quebec City*, 29; Osborne and Swainson, *Kingston*, 63-4; Philp, "Economic and Social Effects," 47; Preston, "Military Influence," 55; Senior, *British Regulars*, 149.

²⁶ McKenna, "Family Life," 9-19; Desmond Morton, *A Military History of Canada* (Edmonton 1990), 79.



Fig. 4. Fort Wellington guard house where soldiers were held prisoner for drunkenness, fighting, and other misdemeanors. The building has been demolished. *Historical photograph provided by Dennis Carter-Edwards, Parks Canada.*

generally thought to be cleaner and more reliable than the average British regular; however, they had been court martialled relatively more frequently. The RCR was posted to Fort Wellington in May 1843 in order to stave off the perennial problem of desertion. Militia men were thought to be largely uneducated, otherwise unemployed or sometimes unemployable, and were often an object of satire, as "incompetent" but "enthusiastic amateurs."²⁷ However, this group has been relatively neglected by historians.

The Hospital Register reveals information about the individuals and their activities. All 278 individuals admitted to the hospital were male soldiers, either members of the militia or of the RCR. Officers, women, and children appear to have been treated elsewhere. The average number of admissions per patient was 1.66 and the average age of all soldiers admitted was 30.4 years (see Table 1). The RCR patients tended to be older with an average age of 37.6 years; they appeared to be admitted slightly more often to the hospital and to stay longer than the other soldiers.

Based on those 381 admissions for which the information is available, the average duration of a stay in hospital was 8.4 days. During the busy months from 1 June 1841 to 1 March 1843 the average duration of stay was 6.7 days. During an outbreak of colds in the winter of 1841-42, the average stay in hospital was only five days. Only ten soldiers spent more than a month in the hospital. William Peachy, a 39 year-old soldier, had the longest hospital stay of at least 148 days, more than twice as long as the next longest (fols. 236-8, 242-5). His discharge date is unknown as his case was carried to a new register, but his pension record indicates that he was discharged from the army as unfit for duty in 1846.

At least six of the soldier-patients were married with wives and children at or near the Fort. All married men were members of the militia, not the RCR, and presumably had been recruited locally. The married soldiers were older than all the other troops with an average age of 39.4 years. These men were sometimes allowed the "indulgence" of recuperating from illness in their own quarters.

Figure 1 displays the pattern of entries by month and year. It can be seen that the register was put to greatest use between June 1841 and March 1842. No entries were made between 25 March and 2 June 1843, 10 August and 6 October 1844, or between 9 February and 24 April 1845. The relatively less frequent use of the register from July 1843 to the end of 1845 invites several different and probably quite incompatible explanations: first, there may have been another register in use at the same time; second, the final attending physician did not record all cases; third, stricter criteria were applied for hospital admission; fourth, the later soldiers

²⁷Preston, "Military Influence," 54; Senior, *British Regulars*, 149; Way, "Soldiering," 191-2; T.C. Willett, *Canada's Militia: A Heritage at Risk* (Boulder 1990), 56-8. For more on the militia and its relationship to the volunteer system in Canada, see Stanley, *Canada's Soldiers*, 209-10; Stacey, *Canada and the British Army*, 23, 93; Hitsman, *Safeguarding Canada*, 79, 90, 98.

were fewer in number or less inclined to report complaints to the medical officer; fifth and least likely, the soldiers were relatively healthier during this period.

Fort Wellington seems to have been spared serious epidemics in the early 1840s. Only one cluster of admissions is suggestive of the contagious fevers that had long been feared by those who cared for soldiers in camps. This was the outbreak of colds, sore throat, and upset stomach (called in the Register "acute catarrh," "cynanche," and "dyspepsia") which occurred between 12 December 1841 and 14 March 1842. It resulted in the majority of the 98 admissions during those weeks. At the peak of the difficulty up to eight soldiers were admitted daily between 14 and 20 January 1842. No lives were lost and all patients were discharged after a short stay in hospital.

Since there were 75 to 100 men at the Fort and 462 admissions from July 1840 to January 1846, the probability of any one man being admitted to hospital in a given year was close to 100 per cent. Using these figures it can be estimated that two or three soldiers were in the hospital at most times. On each day of the 1841-42 outbreak the ward held an average of five or more soldiers. Only one desertion — of a non-RCR soldier — seems to have taken place from the hospital on 1 August 1842 (fol. 155).

The Doctors and Other Attendants

SOLDIERS IN HOSPITAL did not work and were a drain on the public purse, notwithstanding the reduction in their rations and wages for each hospital day.²⁸ Medical officers were to ensure that sick men recovered quickly and went back to their duties. They were also supposed to pay special attention to the causes of sickness with a view to future prevention. During the long term of James McGrigor (1771-1858) as Director-General of the British Army Medical Department from 1815 to 1851, the ancient regulations governing hygiene had to be rediscovered or revised to address concerns raised by the cholera epidemics of the 1830s.²⁹ There is little evidence of sanitary regulation in the Fort Wellington Hospital Register. McKenna's study shows that the atmosphere in barracks was insalubrious, washing conditions less than ideal, and only in summer was laundry done regularly.³⁰

Although the doctors left no identifying marks in the hospital register, at least four different medical officers wrote successive entries. Changes in handwriting appear to define four separate periods.³¹ Sources in the National Archives and the

²⁸Nine pence were deducted from the pay of a soldier for each hospital day. See McKenna, "Family Life," 27.

²⁹Cantlie, *History of the Army Medical Department*, I, 276, 440, 499-500; J. Baird, "Army British: Medical Services," in John Walton, Paul B. Beeson, and Ronald Bodley Scott, eds., *The Oxford Companion to Medicine* (Oxford 1980), 80-3; Laffin, *Tommy Atkins*, 81-2.

³⁰McKenna, "Family Life," 39-44.

³¹First, 29 July 1840 (fol. 1) to 24 April 1842 (fol. 119); second, 7 May 1842 (fol. 120) to 21 September 1843 (fol. 183); and third, 9 October 1843 (fol. 180) to 2 February 1845 (fols.

Roll of Commissioned Medical Officers strongly link four specific medical officers with authors of the Fort Wellington Hospital Register (see Table 2).³² The second author can be tentatively identified as David Dyce; the third and fourth medical authors are definitively identified as Alexander B. Cleland and John D. Macdiarmid.³³

David Dyce, originally of Aberdeen, was the resident Staff Assistant Surgeon to the 48th Regiment and to the garrison from spring 1843 to late September 1843. Dyce may have been replaced by G. Carr, surgeon to the 71st Regiment and who had served at St. Helen's, St. Timothy, and Montreal.³⁴ If Carr had been posted to Fort Wellington, he was quickly replaced in November 1843 by Alexander Brown Cleland and who was at Prescott from November 1843 until March 1845.³⁵ Cleland graduated with an MD from Glasgow in 1838 and died in Trinidad on 25 August 1853.³⁶ In March 1845, Cleland was replaced by John Duncan Macdiarmid who had moved to Prescott from Brockville by May 1845.³⁷ Macdiarmid had been with

225, 228); and fourth, 24 April 1845 (fol. 229) to 3 January 1846 (fol. 245). Because of the manner of record-keeping, the handwriting of two different physicians can be found together on a single page for up to thirteen consecutive pages (see for example, fols. 180-93). The index provides an opportunity to compare all four hands; to observe the most striking contrast, see especially Index "C" and Index "M."

³²Based on information from NAC, MG 13, W.O. 17, provided by Dennis Carter-Edwards. See also William Johnston, "Roll of the Commissioned Officers in the Medical Service of the British Army, 1727 to 1898 [1917]," in Robert Drew, ed., *Commissioned Officers in the Medical Services of the British Army 1660-1960* (London 1968), Vol. 1, 291, no. 4352.

³³Cleland's handwriting on an 1842 letter and Macdiarmid's on a signed requisition for instruments and medicines correspond with those of the third and fourth writers in the Hospital Register. Application for continuance of lodging money, 17 August 1842, signed A.B. Cleland, NAC, RG 8 I, C-Series, Vol. 306, 153-5; "Requisition for Instruments" and "Requisition for Medicines," 1849, signed J.D. Macdiarmid, *Ibid.*, Vol. 308, 164-5.

³⁴Possibly this man was George Carr. See Johnston, "Roll of the Commissioned Officers," 296, no. 4419.

³⁵NAC, W.O. 25, Vol. 632, 28. The arrival and departure dates for Carr and Cleland in National Archive sources do not conform to the changes in handwriting and practice observed in the Register which proceeds without alteration from Dyce's presumed departure to the beginning of the fourth period in April 1845.

³⁶Johnston, "Roll of the Commissioned Officers," 310, no. 4594. The same source indicates Cleland was a staff surgeon on 21 February 1840 and attached to the RCR on 14 February 1845.

³⁷William Filder, letter to Military Secretary Headquarters, 11 February 1845, NAC, RG 8 I C-Series, Vol. 307, 128. A useful guide to this record group is Public Archives of Canada, Manuscript Division, *Preliminary Inventory Record Group 8: British Military and Naval Records* (Ottawa 1954). The fourth period does correspond to the changeover between Cleland and Macdiarmid.

the Army Medical Service since 1835 and was granted an MD by McGill College in 1847.³⁸

Several other physicians who were associated with Fort Wellington at a slightly later period have also been identified. Staff Assistant Surgeon Simpson wrote a letter to the Military Secretary explaining delays in his week-long journey between Buffalo and Prescott where he eventually arrived on 4 August 1847.³⁹ Staff Assistant Surgeon Robert Henry King died at Prescott of erysipelas on 31 July 1853.⁴⁰ The list of Dr. King's personal effects prepared for auction lists the stethoscope and the medical books that he possessed and presumably used during his sojourn there.⁴¹

Blurring the distinction between military and civil, it is clear that Dr. William James Scott, a private practitioner from Prescott, helped with medical care at the Fort in 1850 and, following the death of Dr. King, three years later.⁴² Staff Assistant Surgeon P.S. Laing may have relieved Scott of his military duties, as he submitted

³⁸ Johnston, "Roll of the Commissioned Officers," 297, no. 4433. This physician, who appears to have had some of his training in Canada, was the son of British medical officer Duncan Macdiarmid who died in October 1830. *Ibid.*, 152, no. 2307.

³⁹ Simpson's letter is in NAC, RG 8 I C-Series, Vol. 308, 134. The author was likely Walter Simpson described in Johnston, "Roll of the Commissioned Officers," 326, no. 4763. Possibly he could have been William Simpson (*Ibid.*, 333, no. 4854), but this identity is less likely because William did not receive a medical degree until 1859 and the Simpson in question had signed his name "M.B." in 1847.

⁴⁰ *Ibid.*, 330, no. 4817; Prescott and Cornwall Canada Barracks 1841, NAC, RG 8 II, Vol. 53; Leave of Mr. Daniell, NAC, RG 8 I C-Series, Vol. 598, 62, 66; Letter from Inspector General of Hospitals to the Military Secretary, 2 May 1850, *Ibid.*, Vol. 309, 183; Letter from W. Henry, Inspector General of Hospitals, 2 August 1853, *Ibid.*, Vol. 775, 133.

⁴¹ Papers pertaining to the estate of the late R.H. King, *Ibid.*, Vol. 310, 121-2; reproduced in McKenna, "Family Life," Appendix L, 348-52. Compare with the list of reading for Regimental Medical Officers recommended by the Army Medical Board in the early 19th century, reproduced in Cantlie, *History of the Army Medical Department* I, 502. For more on the libraries and publishing of Canadian physicians, see Jennifer J. Connor, "To Advocate, To Diffuse, and To Elevate: The Culture and Context of Medical Publishing in Canada, 1630-1920," PhD Thesis, University of Western Ontario, 1992.

⁴² In the 1851 Census of Prescott, Canada West, Scott is listed as a fifty-nine year-old English born Episcopalian with a forty-nine year-old Roman Catholic wife, Sarah, eight children, and three servants. The family occupied a two-storey stone house (page 45). Trained with his grandfather in Dublin, Scott had been in Canada since 1814 and was licensed with the Medical Board of Upper Canada in 1834. He died 14 October 1875. His handwriting does not resemble those in the Hospital Register. But National Archive sources pertaining to the Fort suggest that he may have rented a building to the fort from 1841; he acted on behalf of the Barrack Master Daniell in mid-1845. William Canniff, *The Medical Profession in Upper Canada, 1783-1850* [1894] (Toronto 1980). Scott's signature is on two 1850 documents: NAC, MG 13, W.O. 97, Vol. 1190, np, Henry Langley #901; and *Ibid.*, Vol. 1188, np, Patrick Sullivan, #926.

an account of £6/15s/7d for the expenses of transporting himself, a servant, and thirteen articles of baggage from Amherstberg to Prescott, via Detroit, Buffalo, and Kingston between 21 and 28 September 1853.⁴³

Medical officers were salaried and paid at fixed rates that depended on rank and years of service with augmentation for special needs. At the time of his death in 1853, Dr. King earned 7s/6d per day with allowances of 1s/8d per day for lodging and of 1s/6d for a "civil servant" in lieu of a "soldier servant." Deductions were made from an amount called "income duty" at the rate of 5d per £.⁴⁴ In 1846, Dr. Macdiarmid earned a retroactive increase in pay to 10s per diem for having completed ten years of service.⁴⁵ If it was necessary to travel any distance between the hospital and the garrison, the medical officer would be entitled to a horse and a resultant increase in income called "forage."⁴⁶ Civil practitioners who supplied the military personnel with medical care were reimbursed at a weekly rate per person, including not only officers and men, but also women and children.⁴⁷

Other attendants served in the hospital, but only rarely was their presence alluded to in the Register. A Hospital Sergeant lived in the building near the wards. His duties included the maintenance of a vigil, administration of treatments, and sometimes the compounding of medicines from prescriptions.⁴⁸ The observations

⁴³NAC, RG 8 I C-Series, Vol. 310, 130-2. Patrick Sinclair Laing is described in Johnston, "Roll of the Commissioned Officers," 320, no. 4699.

⁴⁴See Statement of Pay and Allowances due the late Staff Assistant Surgeon R. H. King, NAC, RG 8 I C-Series, Vol. 310, 160. For more on rank and rates of pay for staff surgeons in the British Army Medical Service, 1830 to 1850, see Cantlie, *History of the Army Medical Department*, I, 427-8, 432-3.

⁴⁵Sidney Herbert, War Office, 5 March 1846 to Commander of the Forces, Canada. NAC, RG 8 I C-Series, Medical, Vol. 308, 29.

⁴⁶Forage was not taken lightly. Dr. Macdiarmid lost the privilege when he left Isle aux Noix in 1845 and another medical officer, Asst Surgeon Kingdon, unsuccessfully tried to justify it on the basis of the 1.25 miles between the hospital and the Fort at Niagara. William Filder letter to Military Secretary Headquarters 11 February 1845, *Ibid.*, Vol. 307, 128; Correspondence concerning Kingdon, 4 January and 24 February 1854, *Ibid.*, Vol. 776, 7, 21.

⁴⁷See for example, 1853 letters by Mr. Wardell of the Niagara RCR detachment pertaining to payment of private practitioners, including Dr. Sewell of Bytown. Sewell's account shows that he provided care to eighty-five persons at the Bytown detachment for fourteen weeks at the rate of three pence per person per week. *Ibid.*, Vol. 775, 67, 84. In 1861, Dr. W. Burgess of Port Stanley was engaged to attend to RCR soldiers during "Ball Practice" for five hours daily at a per diem rate of 10s 6d. *Ibid.*, Vol. 780, 116. In 1855, Dr. Campbell, another private practitioner, had been denied payment for medical supervision of "Spring Ball Practice." *Ibid.*, Vol. 777, 117. For more on Sewell and on Burgess, both of whom were trained in Edinburgh, see Canniff, *Medical Profession*, 54, 145, 618-9. For more on the payment of medical officers at Fort Wellington and elsewhere, see Philp, "Economic and Social Effects," 44.

⁴⁸A description of these duties is found in a letter from Joseph Harris who had served eight years as a Hospital Sergeant to Sir Charles O'Donnell, 15 August 1841. NAC, RG 8 I C-Series, Vol. 769, 64.

of the Sergeant were included in an account concerning the fatal convulsions of William Dingwell (fol. 48) and in the paroxysmal fever of Charles Cox (fol. 97). Sometimes an agitated patient required the surveillance of two or more attendants, as occurred in the case of Christopher Paling who died in a state of delirium tremens (fol. 109). Female nurses are not mentioned in the Hospital Register, although other documents indicate that by 1862 they were grudgingly engaged "at public expense" for attendance upon women and children in "exceptional" circumstances such as quarantine.⁴⁹

Identifying Disease: I. Symptoms, Signs, and Diagnosis

THE PATIENT'S HISTORY was an important part of the diagnostic process. Information about the illnesses affecting the soldiers at Fort Wellington is available for almost all the soldiers whose records have been preserved (see Table 3).⁵⁰ The men complained most frequently of pains and cough. Headache, the most common pain complaint, was a symptom in 65 cases. More than a third (164) of the 462 cases reported other pains in chest, stomach, arms, legs, back, and many other parts of the body. Coughs were a feature of 73 of the cases, while other cold symptoms and sore throats were the next most frequent complaints, followed closely by swellings, weakness, fever, chills and shivering, nausea, diarrhea, vomiting, and the coughing of sputum and/or blood. Many of the patients with respiratory problems also reported shortness of breath. Loss of appetite, sore eyes, and urethral discharge were significant complaints. Cuts, bruises, frostbite and other skin lesions, such as boils, abscesses, and ulcers resulted in many hospital admissions. Considerable morbidity resulted from skin and urinary afflictions. Some soldiers would wait weeks with scalding pain on urination or painful sores on their genitalia before consulting the physician. Other symptoms were varied but far less frequent.

To establish a diagnosis the attending physicians used information derived from the patient's history and from the physical examination. Specific questions would be asked about the patient's bowel function and the physician would make observations about the patient's general appearance, his pulse, the colour and temperature of his skin, and the state of his tongue. For all four practitioners the most frequently mentioned parameters of well-being were the skin, tongue, bowels, and pulse.⁵¹ Heat, pallor, and other skin changes from the "natural" state were recorded. The tongue could be "natural," or altered in a manner suggestive of disease by being "coated," "white," "furred," "foul," "dirty," "red," or "yellow." Constipated or "confined" bowels were a sign of trouble. None of the examiners appears to have recorded the heart-rate in beats per minute, although they all felt the pulse and noted its quality and its relative speed, be it "hurried" or "slow."

⁴⁹Correspondence concerning female nurses for RCR detachments, 30 January to 6 September 1862, *Ibid.*, Vol. 781, 7-8, 12-3, 20, 63, 41, 103.

⁵⁰A complete list of symptoms reported can be found in Duffin, "Hospital Register," Table 8.

⁵¹A complete list of signs used can be found in Duffin, "Hospital Register," Table 9.

Less often the physicians recorded instances in which they examined the patient's body fluids and excreta — sputum, stools, vomitus, or urethral discharge — for signs indicative of organic disease, such as pus or blood. On three occasions the blood of patients who had been bled as part of their treatment was examined visually and found to have the "buffed" and "cupped" appearance associated with generalized inflammation (and now attributed to an increase in the number of white blood cells). If the appearance of urine was assessed, it was not recorded in the Register.

Differences in diagnostic style among the four doctors raise a question about whether or not the skills of army doctors could be considered "up-to-date." The first (unidentified) doctor to write in the Register tended to be conservative and old-fashioned in both diagnosis and treatment; the third (Cleland) and especially the fourth (Macdiarmid) were innovative.

The first physician made observations about a patient's general appearance more frequently than did his successors. If a patient "looked unwell," then his condition was considered serious; if not, then his complaint was met with skepticism. The first physician also made approximations about a patient's rate and rhythm of breathing, but he did not examine the chest nor did he use the stethoscope, even in cases of pneumonia.

Percussion and auscultation — or tapping on and listening to the chest — were important innovations that had entered medical practice in the 1820s and pervaded it by the 1840s. These techniques permitted the detection of changes in the patient's lungs and heart and allowed the astute practitioner to distinguish pulmonary tuberculosis (or phthisis), which resulted in structural changes in the lungs, from simple colds, which did not. Auscultation was described thirteen times in the hospital record; eleven of the descriptions were written by the third physician (Cleland). The second physician (Dyce) mentioned auscultation on one occasion only in September 1842 when he recorded the presence of "loud mucous rales heard at a distance" (fol. 168); however, it seems that he did not employ a stethoscope to make this observation.

The fourth physician (Macdiarmid) recorded the sounds of phthisis after auscultating and percussing a patient in June 1845 (fol. 233). He also reported on the one and only application of an electric machine used unsuccessfully in a case of paralysis (fol. 243). Reflecting his apparent interest in new technology, he was later responsible for placing an ambitious order for four stethoscopes, four cases of dissecting instruments, four barometers, four atmospheric thermometers, four register thermometers, three rotatory electro-magnetic machines, four urinometers, six pluviometers, one case of acupuncture needles, and three microscopes of "good power for pathological purposes for Quebec, Montreal, & Kingston."⁵² To place

⁵²"Requisition for Instruments, etc for the Use of Her Majesty's Forces in Canada for the year ending 31 March 1849," signed Macdiarmid, Staff Surgeon 2nd Class in Charge, *Ibid.*, Vol. 308, 164.

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this order the doctor used a standard issue form printed in the 1840s, but only the category of stethoscope was considered routine enough to have been pre-printed; the other more original requests had to be added to the list in handwriting. If Macdiarmid ever received his order of microscopes (and there is no indication that he did), they may have been among the earliest applied to anatomical dissection in Canada.⁵³ The only other instrument mentioned in the Hospital Register of Fort Wellington was the atmospheric thermometer.

Assessment of such symptoms and signs led to a diagnosis, the official label given to the patient's illness. The Hospital Register provided a special place to enter the diagnosis (usually in Latin).⁵⁴ The names applied to the disease by the medical officers are typical of those used elsewhere in the middle third of the 19th century, but taken at face value, they cannot be construed as reflecting the incidence of diseases as they would be diagnosed in the late 20th century. Reconstruction of statistics concerning morbidity and mortality is a notoriously difficult task and the subject of great debate. Demographers are optimistic that existing sources can be examined to provide relatively exact information; historians, on the other hand, are skeptical of the entire enterprise, recognizing the paucity, uncertainty, and fallibility of written records, which reflect the priorities and origins of their authors as much as they describe the conditions of past "reality."⁵⁵

To a certain extent the diagnoses imposed by the Fort Wellington physicians reflect the nature of the symptoms suffered by the men (Table 4).⁵⁶ The most frequent diagnosis was "catarrh acutus," or common cold; together with "cynanche tonsillarius," or inflammation of the throat, these upper respiratory diseases were responsible for more than 120 admissions.

Injuries affected more than 70 men. Most of the injuries were attributed to accidents. There is a discrepancy between the higher frequency of the diagnosis of injuries and the lower number of soldiers actually complaining of injuries (compare Tables 3 and 4). The discrepancy may be explained by two possibilities: first, some symptoms of unexplained "pains" or "swellings" were later resolved by the physician into a diagnosis of injury; second, some injury diagnoses appeared in the index, but the associated symptoms were recorded on missing pages. One soldier was scalded by boiling water which he accidentally spilled on his groin when working as a duty cook; the entire surface of his penis blistered and sloughed, but he appears to have recovered without complication (fol. 180).

⁵³J.T.H. Connor, "Medical Technology in Victorian Canada," *Canadian Bulletin of Medical History/Bulletin canadien d'histoire de la médecine*, 3 (1986), 97-123.

⁵⁴A complete list of diagnoses can be found in Duffin, "Hospital Register," Table 10.

⁵⁵For more on this problem see the forthcoming collection of Working Papers presented at the conference on "The History of the Causes of Death," organized by George Alter and Ann Carmichael and held at University of Indiana, Bloomington, November 1993.

⁵⁶The list could be compared to the Annual Returns of the Disease of the Troops Serving in Canada, at least some of which are in the NAC, McGrigor Papers, MG 40 F1, Reel A-877, Vol. 65 (for the year ending 31 March 1858), Vol. 105 (1861).

Various fevers were identified in fifty-one men, four of whom were thought to have a form of ague or malaria.⁵⁷ Fever was applied as a diagnosis more frequently than it appeared as a symptom; just as for injuries, the doctors resolved and combined the patients' various complaints of pain, especially headache and stomach pains, into precise fever labels.

"Dyspepsia," or derangement of the stomach, was diagnosed in 34 soldiers, but it appears that in at least half the cases it was a euphemistic term for drunkenness or the effects of hangover, as will be explained in the section on causes below. "Ophthalmia," or inflammation of the eyes and eyelids, was known to be highly contagious and a possible cause of blindness.⁵⁸ At Fort Wellington, it was recognized in 22 men.

Venereal disease was recorded as a factor in at least twenty-seven admissions; and in another nine cases the narrative implies that it had been considered but rejected as a diagnosis. Syphilis and gonorrhea were specifically named in twenty-three of these admissions involving seventeen different men. RCR men were thought to have venereal problems slightly more often than their locally engaged militia counterparts (13.4 per cent versus 6.4 per cent of admissions). Of the twenty-two patients with eye trouble, at least two were said to have had venereal disease on other admissions, suggesting a suspected gonococcal origin for their eye problems (fol. 174; fol. 184). Ulcers, abscesses, and boils accounted for 44 admissions. Some of these skin problems were probably associated with underlying venereal disease, but the doctors rarely made the connection.

Delirium tremens occurred in nine men, one of whom suffered a second attack; all cases of delirium tremens had been triggered by cessation of drinking, either by prior disease or by imprisonment. Specific acute conditions such as pleurisy, pneumonia, erysipelas, scarlet fever, acute rheumatism, and smallpox occurred infrequently. A cluster of five cases of measles was seen in 1840, but the details were on pages now missing from the Register.

Pulmonary tuberculosis, or "phthisis," has been considered to be the most common disease at the time and has traditionally been held responsible for approximately 25 per cent of all deaths in the general population. The evidence for tuberculosis among the Fort Wellington soldiers is suspiciously small. Only two soldiers were expressly thought to have phthisis. One man was found to have had tuberculosis at autopsy, but the disease had not been recognized prior to his death. Ten others suffered chronic catarrh or pleurisy, conditions suggestive of the disease. The apparently low incidence of phthisis in the Hospital Register might

⁵⁷For more on malaria in Ontario, see Charles G. Roland, "'Sunk under the Taxation of Nature': Malaria in Upper Canada," in Charles G. Roland, ed., *Health, Disease, and Medicine. Essays on Canadian History* (Toronto 1984), 154-70.

⁵⁸The British army was alerted to the problem of ophthalmia following its experience in Egypt during the Napoleonic War. As a result, the incidence of inflammation of the eye was made a formal part of the annual reports of sick soldiers. Cantlie, *History of the Army Medical Department*, I, 273-81.

have been higher had the first two physicians made more extensive use of the stethoscope. Failure to mention the diagnosis in the ten suggestive cases hints that the doctors may have avoided using the terrifying term to keep up patients' morale and their ability to work. Statistics on tuberculosis mortality among different social groups still need greater study.⁵⁹

It seems that only a few men were discharged from military service for medical reasons. On the last page of the Register, the first physician kept a list of five men who were seen and found unfit for further service. The other physicians did not continue the practice. The information in the Hospital Register has been correlated with that available in the pension records for 33 RCR soldiers.⁶⁰ Of the twenty-five men discharged due to "disability" or considered "unfit" for further duty, twelve suffered from chronic rheumatism and five from unspecified chronic pain. Except for the problems affecting the aforementioned William Peachy of the lengthy stay, little correlation could be found between diagnoses recorded in the Hospital Register and the medical opinion given in the later pension record.

Comparison of illness patterns of military men with those of their civilian contemporaries in the same environment has yet to be fully explored, but preliminary evidence suggests that soldiers' diseases were different. Adult civilians seem to have suffered most from tuberculosis and the specific acute conditions of pneumonia, pleurisy, rheumatic fever, scarlet fever, and erysipelas.⁶¹ Soldiers suffered relatively more injuries, more venereal disease, and fewer specific fevers than did their civilian neighbours. The differences seem to be related to the nature of military life and work as will be discussed in the section on causes below.

Identifying Disease: II. Deaths and Postmortem Examinations

SIX MEN DIED following admission to hospital and autopsies were performed to determine the causes of death (Table 5). The average age of the men who died was 38.6 years. Two were identified as having been "hard drinkers" and another, at the age of 41 years, was described as "an old soldier" (fols. 106-8, 109, 112, 161). Most died within a few days of the onset of acute illness, but one was in hospital for 44

⁵⁹A surprisingly low incidence of tuberculosis was also found in one mid-19th century community practice. Jacalyn Duffin, *Langstaff: A Nineteenth-Century Medical Life* (Toronto 1993), 114-7. For an interesting study of morbidity and mortality, including that related to tuberculosis, conducted through the use of trade union records, see Humphrey Southall and Eilidh Garrett, "Morbidity and Mortality among Early Nineteenth-Century Engineering Workers," *Social History of Medicine*, 4 (1991), 231-52.

⁶⁰Pension Records of the Royal Canadian Rifle Regiment, NAC MG 13, W.O. 97, Vols. 1185-1194. Summary provided by Katherine McKenna. See also, McKenna, "Family Life," 413.

⁶¹For a presentation of the illnesses and their patterns affecting a mid-19th century community in Ontario, see Duffin, *Langstaff*, 92-125.

days before he succumbed to the ravages of pulmonary tuberculosis. His admission diagnosis had been "dyspepsia" (fol. 46, 50).

Detailed circumstances of each death were recorded. William Dingwell died after suffering paroxysmal "convulsions taking the form of opisthotonus" (fols. 48-51). In an effort to determine the duration of these symptoms the doctor questioned the sergeant who had "observed that during 1 or 2 previous paroxysms [Dingwell] had this rising of the belly and chest but [the Sergeant] thought it arose from flatulent distention of the parts of which the patient always complained." The danger of the patient's condition might have been recognized earlier, but the Sergeant's mistake in confusing seizures with abdominal gas was reported without criticism; possibly the doctor knew that earlier treatment would not have saved the soldier's life.

Autopsies were performed on the bodies of all six dead men, usually within twenty-four hours of death. The examination was limited to macroscopic (or gross) inspection of the cadaver and the internal organs. Neither microscopes nor chemical analyses were used. It is not certain if the head was opened in every case, although the brain and meninges were examined in those who had experienced seizures.

The antemortem diagnosis did not always conform to the pathological diagnosis. Since the stethoscope had not been used during the illnesses of any of the deceased, the findings in one man of disseminated tuberculosis and in two others of severe aortic valve disease of the heart seem to have come as a complete surprise to the examiners (fol. 48-51, 132, 141). The hospital record is vague about the presumed causes of these dramatic physical changes, but as will be shown below, further analysis suggests that they, too, were the product of military life.

Managing Disease: Treatments and their Effects

THE OBJECTIVE OF TREATMENT was to send the soldier back to work. Almost every man admitted to the Fort Wellington Hospital was given a medication. The medicines and therapies seem to have been typical of the orthodox pharmacopoeia of the middle third of the 19th century (Table 6); the most frequently prescribed medications for each of the four physicians were similar.⁶² Prescription information is available for 394 cases. Only ten men received no drugs: of these "untreated" men, one deserted, one had a mild cold and returned to duty, while the others had

⁶² A table comparing the ten drugs most frequently used by each physician, the complete list of all medications used, and a comparison of the Fort Wellington pharmacopoeia with that of other hospitals and garrisons, can be found in Duffin, "Hospital Register," Tables 13, 14, and Appendix 5. More information about the remedies prescribed at Fort Wellington can be found in the following contemporary treatises on therapeutics: Robley Dunglison, *General Therapeutics and Materia Medica* (Philadelphia 1846); Robley Dunglison, *Medical Lexicon: A Dictionary of Medical Science*, 12th ed. (Philadelphia 1855); J. Moore Neligan, *Medicine, Their Uses and Mode of Administration* (New York 1849); Jonathan Pereira, *The Elements of Materia Medica and Therapeutics* (London 1842).

sustained cuts or bruises that were bandaged. The selection of drugs reflected the early 19th-century preoccupation with the elimination of disease-causing toxins; thus laxatives, emetics, sudorifics, bleeding, and techniques to promote blistering appear frequently.⁶³

Diet was the first line of therapeutic intervention; most patients were placed on reduced rations, which were thought to be an incentive for recovery.⁶⁴ Alcohol was used sparingly, although military doctors elsewhere made liberal use of it as treatment.⁶⁵ At Fort Wellington, medicinal alcohol seems to have been reserved for the specific situation of delirium tremens — all men with this problem were immediately placed on brandy. Only one other man was given portwine and another ale, the rest had to wait for discharge in order to resume their drinking.

Purgatives and other strong laxatives dominated the pharmacopoeia. The majority of patients were treated with them, even if they had not complained of constipation. The most frequently prescribed medication was calomel, a mercury derivative that acts on the bowel. A compound containing calomel combined with colocynth, a purgative extracted from the bitter cucumber, was also prescribed frequently. Other purgatives, such as magnesium sulphate, jalap, rhubarb, castor oil, senna, and unspecified cathartics, appeared often. Mercury compounds were considered to be specific remedies for syphilis; most men diagnosed with this disease were given mercury.

Antimony-containing compounds were the second most frequently prescribed type of drug. These strong remedies were thought to have a specific action against inflammatory fevers that was not dependent on the unpleasant side effects of vomiting, diarrhea, and sweating.⁶⁶ Ipecac and other emetics represented the third

⁶³To order supplies doctors completed a pre-printed requisition of those drugs used regularly by the army; space was provided for additional non-routine requests. One such requisition was completed by J.D. Macdiarmid in 1849. See NAC, RG 8 I C-Series, Vol. 308, 165.

⁶⁴Abbreviations used in the diet column of the register were "sp[oon]" (234), "H" (67), or "L" (20). They most likely correspond to the categories described in the 1808 "Instructions to Regimental Surgeons", of "spoon or fever diet," "half" diet, and "low" diet. Special foods such as arrowroot, barley water, beeftea, gruel, milk, mutton, oatmeal, rye bread, and tea were prescribed for 51 men considered to be in need of special sustenance. These items were added to the diet individually without a code, but they seem to correspond to the 1808 category of "full" diet. Donald E. Graves, "Fort George Historical Study," Parks Canada, Manuscript Report Number 353, 1979, Appendix L, 154-5. See also Cantlie, *History of the Army Medical Department*, I, 502-3, 506.

⁶⁵In Woodward's classic 1863 survey of the diseases in the United States army, all indexed references to alcohol were concerned with its properties as a treatment. See Woodward, *Outlines of the Chief Camp Diseases* [1863].

⁶⁶Jacalyn Duffin and Pierre René, "'Antimoine; Antibiotique': The Public Fortunes of the Secret Properties of Antimony Potassium Tartrate (Tartar Emetic)," *Journal of the History of Medicine and Allied Sciences*, 46 (1991), 440-56; John S. Haller, "The Use and Abuse of Tartar Emetic in the Nineteenth-Century Materia Medica," *Bulletin of the History of Medicine*, 49 (1975), 235-57.

most frequent category of remedies. Analgesics were prescribed, but the use of opium in only 59 cases contrasts sharply with the high incidence of pain and headache as symptoms in the majority of patients.

Mechanical remedies to produce blisters were among the most frequently prescribed treatments. The usual blister plaster was a dressing applied over a powder made up of crushed Spanish flies (cantharides), an irritant which causes a blister to rise on the underlying skin. If the blister rose well, the doctor (and presumably his patient) could feel reassured; when the blister did not rise, there were concerns about the integrity of the patient's physiology.

Other topical remedies, such as mustard poultices, cold or tepid baths, and liniments consisting of turpentine, ammonia, and iodine were also used regularly, especially for colds, aches, muscular and joint pains, and bruises. The first physician was fond of prescribing "pediluvia" (foot baths). For the problems of conjunctivitis and venereal sores, certain specific drugs were used, especially lead acetate, silver nitrate, and copper sulfate. Men with purulent gonorrhea or ulcers on the genitals were to wash frequently in alum lotion, to bathe the groin, and to wear a piece of lint between the glans and the foreskin (e.g. fol. 74). Four men with severe burns were dressed with silver nitrate or liniment of lime.

Bloodletting enjoyed variable popularity during the 19th century as a remedy for high fevers and inflammatory conditions.⁶⁷ It was practiced either by venesection, which removed a pint or more of blood, or by cupping, which removed smaller amounts. Its application at Fort Wellington, where fevers were common, seems to have been relatively infrequent. All four doctors used bleeding, but only twelve men were subjected to phlebotomies and seven to cupping. It is impossible to characterize the non-bleeding doctors as either "progressive" or "conservative," since both proponents and opponents of bleeding thrived throughout the century.

All four practitioners had a tendency to "polypharmacy" — that is to use more than one remedy at a time. The maximum number of drugs or other remedies each doctor prescribed simultaneously for individual patients during single admissions was sixteen, twelve, seventeen, and nineteen respectively. Criticisms of polypharmacy and a general abandonment of drastic or heroic remedies were soon to occur, but the practice was typical of all reputable physicians in the 1840s.⁶⁸

The attending physicians were called "surgeons" or "assistant surgeons," a title that reflects the high value placed on wartime repair of injured soldiers. Ironically, however, during peace the "surgeons'" practice was far from "surgical."

⁶⁷Guenther B. Risse, "The Renaissance of Bloodletting: A Chapter in Modern Therapeutics," *Journal of the History of Medicine and Allied Sciences*, 34 (1979), 3-22.

⁶⁸John Harley Warner, *The Therapeutic Perspective. Medical Practice, Knowledge, and Identity in America, 1820-1885* (Cambridge, MA 1986); Charles E. Rosenberg, "The Therapeutic Revolution: Medicine, Meaning, and Social Change in Nineteenth-Century America," in Charles E. Rosenberg and Morris J. Vogel, eds., *The Therapeutic Revolution: Essays in the Social History of American Medicine* (Philadelphia 1979), 3-26.

Anesthesia did not become established practice until after October 1846, several months following the final entry in the Hospital Register. A general understanding of the principles of antiseptics was more than two decades away. Since an operation inevitably entailed unrelieved pain and the risk of infection, doctors avoided using the knife. In the pre-anaesthetic, pre-antiseptics period, military doctors debated what was the appropriate emphasis on battlefield speed, the merits of delayed operation, and the nature of dressings.⁶⁹ But the arguments were not tested by the medical officers at Prescott, where surgical therapies were few and simple.

Surgical operations at Fort Wellington between 1840 and 1845 were confined to the lancing of abscesses and boils and a single operation to remove intractable hemorrhoids. Use of the lancet was recorded only twelve times in the Register: nine in the term of the second physician for draining pus from abscesses of the skin, teeth, or lymph nodes. Two men who suffered from the testicular swelling commonly associated with gonorrhea (*hernia humoralis*), were treated by the lancet. One of the two had his testis lanced on three separate occasions (fol. 171).

The man who underwent surgery for his piles had suffered greatly, with "several large" hemorrhoids, but, the doctor wrote, he "has never felt the disease any inconvenience to him 'til the last three days; the tumours are now inflamed and here and there ulcerated." As a result "the large pile" was "cut off" and two days later "another [was] removed." The doctor explained that "only one [pile] at a time is removed for fear of any difficulty with hemorrhage." Four days later there were "no piles of any consequence remaining" and the man, quite understandably, was "asking to return to his duty" (fol. 100).

Surgical practices extended to the placing of catheters, the dressing of wounds, and the reduction or splinting of sprains, dislocations, and fractures. A single individual was catheterized for a urinary stricture attributed to his having fallen over a cask two years previously (fol. 208). Details pertaining to the two fractures are missing. Splints and straps are mentioned in the treatment of four other patients who had sustained bruises or cuts. They appear to have been used to immobilize the affected part and promote healing. Fomentations of tepid water or other substances were applied to injured parts, especially in dislocations, frostbite, and bruises where the skin had not been broken. Flour and spermaceti ointment were also used to dress frostbite; on at least one occasion the physician indicated that rubbing with snow was effective (fol. 105).

The non-invasive treatment of rest was mentioned only three times, and only by the first physician who seems to have been somewhat conservative (fols. 94, 110, 111). The fourth physician, who had a fondness for costly innovations and had perhaps visited Fort George, twice recommended removal to the milder climate of Niagara "for a change of air" (fols. 235, 230).

Although physicians were expected to practice hygiene and prevent disease, there is little evidence of preventative measures in the Hospital Register. Quarant-

⁶⁹Charles G. Roland, "Introduction," in Douglas, *Medical Topography*, vii-xii.

tine may have been used in some cases, but it is not clear how or when. The one man who suffered confluent variola (smallpox) was kept in the hospital during his entire illness, although earlier army regulations suggested he should have been sent to "private and remote lodgings."⁷⁰ Possibly the rule had been changed or bent, based on the ill-founded, mid-century supposition that all the men had been vaccinated.⁷¹ When the soldier's condition had improved he was given a fortnight's furlough for cosmetic purposes to "get rid of the unpleasant appearances caused by the red marks of the eruption" (fol. 67). Similarly, two men with scarlet fever were kept in the hospital for a few days (fols. 111, 115).

Sometimes the doctors would try to determine if new symptoms were caused by the unresolved disease or by the treatment (iatrogenic). The side effects of mercury, which include sore mouth and bleeding gums, were recognized in several patients and the drug was discontinued (fol. 93). The third physician was particularly diligent about recording when he had ordered drugs to be discontinued, but all doctors seem to have been well aware of iatrogenic complications. For example, a man, who complained of a bad taste in his mouth, was noted to have had the symptom before he was given mercury (fol. 46). Another man was noted to be much worse following a venesection, but he eventually recovered and the physician did not indicate whether or not he felt the treatment had hastened or hindered the final outcome (fol. 164).

Much has been made of the dangerous side effects of 19th-century therapy, and the strong drugs added to small meals and the sparing use of pain-killers may have provided an incentive to go back to work. Most often, however, treatment seemed to alleviate the symptoms: in at least 73 cases, remarks in the Register suggest that the doctor and/or the patient recognized improvement, which was attributed to the Hospital remedies. The vast majority of the men were discharged to their duties having recovered, despite (if not because of) the treatment. None of the deaths at Fort Wellington can be ascribed to medications.

Causes of Morbidity and Mortality

THE CAUSE OF THE DISEASE was recorded in only 10 per cent of cases; 51 of the 462 admission records provide an explicit reference to the presumed cause of the soldiers' ailments, but only 43 of these were accepted by the physician. In eight cases, the patient's theory on the cause of his ailment was reported simply to be rejected. Few of these causes were related to conditions that the medical officer could be expected to control. Despite the doctors' relative silence on the subject of etiology, several major causes of disease can be extracted from the record by analysis of the diagnostic and therapeutic choices. Some of these causes were unknown to the medical officers, others may have been deliberately obscured by

⁷⁰Cantlie, *History of the Army Medical Department*, I, 500.

⁷¹Vaccination had been adopted by the British army in 1800, Cantlie, *History of the Army Medical Department*, I, 281-2.

them in an attempt to protect their patients or themselves from the wrath of the army. To a certain extent military life and work caused not only the ailments, but also the particular structure and content of the Register source.

Causing Disease: I. Work and the Environment.

THE RIGOROUS COLD of Canadian garrisons was often touted as the cause of sickness. When Mr. Griffiths had been the surgical officer at Prescott during the War of 1812, he had observed that the facilities were extremely cold and lacked an atmospheric thermometer.⁷² With the new renovations the medical officer had been provided with a thermometer, but it is not clear if the conditions had truly improved or if they had simply become better documented. Atmospheric temperatures were mentioned three times in the Hospital Register to record temperatures of zero degrees Fahrenheit in January. On one occasion, a man suffered frostbite when the temperature was at a balmy ten degrees above zero, but the physician noticed that there had been a wind (fol. 105).

Cold temperatures and high winds were thought to favour the outbreak of diseases other than frostbite. In more than half of the 43 cases for which the doctor recorded a precipitating cause, cold was considered to be the culprit. The pension records also named cold and inclement weather as causes of disability. Most soldiers related the cold to the winter, but the doctor sometimes indicated that the illness was a product of the *added exposure* provided by the conditions at the garrison itself — a specific feature of military life that did not affect civilians who shared the same climate.

Consequently, men were thought to have become sick from the cold in the barracks, prolonged guard duty, and working for many days in waist-deep water (fols. 182, 215, 43). Indoor cold was a problem not only in the barracks but also in the hospital wards in late spring: on 15 May 1845, the third physician wrote that he decided not to use his stethoscope on a patient's chest because of "the state of the weather and the exposed state of the ward" (fol. 229). In June of the same year, two other men were each admitted because of ailments ascribed to having slept on the open deck of the steamer boat while *en route* to Prescott (fols. 145, 146).

Guard duty provided an exceptional opportunity for soldiers to become chilled. Nine men experienced their first symptoms either during or immediately following their watch. At least one physician noted that the Blockhouse was in an exposed situation (fol. 229). The guard room or prison was even more notorious as several men were taken seriously ill while incarcerated there; not surprisingly, then, one doctor called it "the black hole" (fol. 56). Some prisoners in the guard room had inflicted wounds on themselves through the violent behaviour of anger, drunkenness, or delirium tremens, but others were thought to have sickened because of the prison itself. The physician wrote that a soldier "was brought to the hospital from

⁷²Douglas, *Medical Topography*, 33.

the guard room where he had been confined for being drunk and shouting at the Colonel. He was faint and sick from the closeness of the place and [had a] disorder of his stomach from drinking" (fol. 75). Another prisoner with a cold was said to "look miserable enough" after incarceration (fol. 88). Most were sent directly back to the guard room once their illness had subsided.

Hot weather was also thought to be detrimental to the soldiers' strength, but only one man was admitted to hospital for a problem that was directly attributed to the summer heat (fol. 237). Another who had been on cooking duty in March attributed his sickness to the heat of the stove and the stuffiness of the kitchen; however, the doctor indicated that drinking may have been the real cause of his illness (fol. 113).

Accidents happened at the fort fairly frequently; no less than four men had to be admitted for injuries sustained when they slipped and fell on the barrack steps. None of these men was said to have been drinking and since three of these accidents occurred in mid-winter, it appears that snow, ice, or faulty steps may have been related factors.

Seasonal variation in disease was considered to be important by observers of early 19th-century health. For example, respiratory infections were generally thought to occur in the winter and early spring, diarrhea and ague in the summer and fall.⁷³ Seasonal patterns of disease are less apparent in the Fort Wellington Hospital Register than other published reports would predict. Among the few conditions that do correspond to traditional patterns were four of five cases of pneumonia, which occurred between February and April, and the extended outbreak of colds in the winter of 1841-42. Frostbite cases occurred only in January or February.

In contrast, with the exception of the 1841-42 outbreak, other respiratory infections could occur at any time of year. The incidence of some diseases followed weak seasonal patterns. Intermittent fever or ague was recognized in every month except December and January. Diarrhea, "the summer complaint," tended to occur between June and October, but one or more cases were also observed in every month except April and May. Ophthalmia was slightly more common in the late spring and early summer, but cases were observed in other seasons too.

Some more surprising patterns of disease seem to emerge and invite speculation about their possible causes and relationship to living conditions. Cuts and dislocations with one exception occurred exclusively in fall and winter.⁷⁴ Were they due to the hazards of ice and chopping wood? Venereal disease, which occurred in all other seasons, was never diagnosed in spring (March, April, or May)

⁷³Woodward, *Outlines of the Chief Camp Diseases*, 15-8, 162-3, 206-9, 284-5; Roland, "Introduction," in *Medical Topography*, vii-xii. Ague affected 2/3 of the garrison population at Fort Defiance in the fall of 1795. Knopf, "Surgeon's Mate," 246.

⁷⁴Wounds were frequent in the winter months of 1795 at Fort Defiance. Knopf, "Surgeon's Mate."

— the season for love perhaps, but not for lust? With the exception of one case in August, delirium tremens was recognized only in the months of January, February, March, and May. Was there less desire for alcohol when winter had passed?

The after-effects of marching, route-marking, and parade duty often brought men to the hospital with aches and pains in their limbs, joints, feet, and backs. The very prospect of these same activities sometimes led men to the doctor even before the work had taken place. For example, one soldier attended the hospital saying that he “fell in the street yesterday and sprained his right ankle [and] ... felt it too painful to parade for route-marking today” (fol. 98). Other less probable associations were made between physical exertion and body pain. One soldier who suffered pain and swelling of his left testicle claimed that he “felt the disease commencing just before marching yesterday and it was much worse at his return.” Seemingly unconvinced by the claim, the doctor wrote that the patient “admits [to] having been in the way of getting venereal disease” (fol. 91).

Causing Disease: II. Drinking and Fighting

THE PRODUCTS OF BOREDOM and deprivation — both drinking and fighting — were considered to be “criminal” concerns rather than “medical.” A soldier found to have been engaged in either activity could be sent to the insalubrious “black hole” rather than to the hospital where he might enjoy the relative luxury of a (spoon) diet and a (chilly) bed. Drinking and fighting were not problems for the doctor until they resulted in extreme damage; even then, it was the damage, not its cause, that constituted the medical responsibility. Further compounding this situation in some posts was the fact that military doctors sometimes prescribed large doses of alcohol as a therapy.⁷⁵

In garrison towns, newspapers could be relatively silent on the subject of military drinking, although intemperance was held to be the “soldier’s worst fault” and the cause of 80 per cent of all crimes.⁷⁶ Possibly, the general public thought it was normal for soldiers to be drunk; certainly, many civilians profited from their habits. Even historians who have written about the medical history of the British army have tended to further obscure the problem.⁷⁷ As a result, all sources, both

⁷⁵Woodward, *Outlines of the Chief Camp Diseases* [1863].

⁷⁶Lacelle, *British Garrison in Quebec City*, 29; See also Philp, “Economic and Social Effects,” 47. On the prevalence of and attitudes toward drinking in Canada, see Cheryl Krasnick Warsh, “‘John Barleycorn Must Die’: An Introduction to the Social History of Alcohol,” and “‘Oh Lord Pour a Cordial in Her Wounded Heart’: The Drinking Woman in Victorian and Edwardian Canada,” both in Cheryl Krasnick Warsh, ed., *Drink in Canada: Historical Essays* (Montréal 1993), 3-26 and 70-91 respectively.

⁷⁷For example, in his comprehensive history, Cantlie described “hard drinking” as the soldiers’ “sole consolation,” which nevertheless “helped to ruin their resistance and encouraged the liver complications [of amoebic dysentery and malaria].” See Cantlie, *History of the Army Medical Department*, I, 459. Yet, in Cantlie’s otherwise extensive index, there are

primary and secondary, pose special difficulties for those who would explore the relationship between drinking and fighting, and health and disease in the military.

Rather early in the history of the medicalization of drinking and only a decade after the period under study, the British army doctor, James Miranda Barry, lamented the lack of attention to the social conditions of military life that tended to foster drink. Disguised as a man all her adult life, Barry rose to become Inspector General of the British Hospitals in Canada between 1857 and 1859. She wrote that

one of the causes [of intemperance] and a great one is the absence of separate accommodation for married persons as, however limited, a room for each family would indeed be not only a great boon to the soldier, but diminish intemperance, which is the chief cause of crime, punishment, sickness, and death.⁷⁸

Unlike Barry, however, most doctors did not feel implicated in the problem of drinking: the concept of "alcoholism" was yet to be medicalized as a diagnosis and there were several compelling reasons to ignore if not suppress all knowledge of drinking.⁷⁹

At Fort Wellington, men who were drunk were thrown in the guard room where they sometimes contracted other ailments. It seems that "drunkenness" by itself was not a reason for admission to hospital. If a drunk man was brought to the doctor before he was taken to jail, he could be saved from the guard room and the probability of some other disease, if and only if another diagnosis could be found.

Drinking appeared in the records of approximately 15 per cent (58) of the 393 admissions for which details have been preserved; however, the record attests to only 2 men having been admitted while intoxicated and, in both cases, the official diagnosis was "fever" (fols. 241, 245). When drinking was mentioned, it was not always cited as a cause. Drink was explicitly stated to be a cause in less than half (fourteen) of the forty-three cases with identified causes, including four cases of cuts and bruises, three of fever, three of dyspepsia, and one each of diarrhea, constipation, catarrh, and boil. Its *cessation* appears to have been the presumed but unnamed cause in the ten cases of delirium tremens, all of whom were treated with brandy. Other patients who drank, but whose illnesses were officially caused by

no entries for alcohol, drinking, intemperance, rum, whiskey etc., and the many statistics he cited on diseases and health neglect drinking or its consequences in any form.

⁷⁸"Annual Diseases of the Troops Serving in Canada During the Year ending 31 March 1858," NAC, McGrigor Papers, MG 40 F1, Reel A-877, Vol. 65, 6-7. The same words are cited in the biography of James Barry by June Rose, *The Perfect Gentleman* (London 1977), 146.

⁷⁹In Canada, alcoholism seems to have received a medicalizing boost in the late 19th century when it emerged from a male subculture to be recognized and deplored in women. See Warsh, "Drinking Woman." For more on medical attitudes to British military drinking, see Strachan, *Wellington's Legacy*, 64-8; Skelley, *Victorian Army*, 64-5.

their drinking, were given the less obvious diagnoses of cuts, bruises, colds, fevers, hepatitis, and the intriguing diagnostic category of "dyspepsia."

"Dyspepsia," or derangement of the stomach, provided a euphemistic loophole to protect both soldiers and officers from disapproval of authorities. This process of disease construction was not necessarily deliberate; the doctors may have convinced themselves of the validity of the concept, or may even have been taught to classify some symptoms of drinking in a manner that would identify the sick drunk from the merely drunk. The potentially euphemistic aspects of this epistemological process are similar to those described by historians who have studied the "discovery" of the hotly debated neuroses of war.⁸⁰

Of the thirty-four cases of dyspepsia admitted to the hospital, thirteen were recorded to have occurred in men who were drinkers. Given the hangover-like symptoms that seem to have characterized this now defunct diagnosis, it is probable that drinking or drunkenness was a causative factor (if not the essence of the malady) in a significant number of the twenty other cases of "dyspepsia" in which drinking was not mentioned, and possibly in other conditions too. For example, one man was "admitted with a boil on back of the hand" under the diagnosis of "phlegmon" (boil); however, the description of his symptoms implies that dyspepsia would have made a suitable diagnosis: "stomach deranged and system somewhat [feverish?] from intemperance" (fol. 232). But for the purposes of diagnostic record-keeping, the doctor focused on the boil. Was it possible that the vigilant authorities might understand the significance of too many cases of dyspepsia? Did doctors choose to vary their euphemistic practices?

At times, the doctor was obliged to dispense with technical niceties. When another man, who had originally been admitted for a skin boil, developed delirium tremens, he was subjected to the formality of being "discharged and readmitted under the heading of delirium tremens." In the raving of his final illness, the doomed patient probably did not notice the procedural change (fol. 109). This man was one of the six who died at the Fort Hospital in the years under study (see Table 5). It is now clear that he died of drink, as did one other, who was also found to have a greatly enlarged liver and spleen. However, the reports of their postmortem examinations did not make the obvious connection, a linkage which had already been recognized by pathologists prior to that time.

Fighting was another taboo subject that resulted in an indeterminate amount of morbidity. Only two men confessed to having fought. One was nineteen year-old James Kelly, the other, twenty year-old William Donoghue, who on the night before he was admitted "got in a squabble with two countrymen and got a severe

⁸⁰When the conditions called "Soldier's Heart," "Shell Shock," and "Battle Exhaustion" were "constructed," there was concern over the possibility that the new "diseases" were simply euphemisms for fear, cowardice, and malingering — all conditions that had been punishable in earlier times. Brown, "Shell Shock," 315, 317; Copp and McAndrew, *Battle Exhaustion*, 48, 53, 106; Howell, "'Soldier's Heart.'"

beating" and felt "pain all over face" which was scratched, bruised, and disfigured (fol. 77 and 90).

If a soldier's injury had been associated with drinking, whether or not fighting was involved, he was likely to wait a few days before reporting it. For example, one man was said to have "got drunk ... a few days ago and fell and cut his forehead just at the root of the nose. He plastered the cut but it has not united and the eyes look unhealthy" (fol. 68). Sometimes the confession of drunkenness helped to avoid a further confession of fighting. At least nine men admitted to sustaining injuries after falling down while drunk, while another claimed that he "got exceedingly drunk last night and whilst in that state received several contusions and lost a piece of his left ear. He does not know how" (fol. 59).

All forms of injury seem to have raised suspicions of clumsiness, drunkenness, fighting, or some other type of military failing. The aforementioned discrepancy between soldiers' complaints and doctors' diagnoses suggests that the men were not keen to characterize their ailments as injuries for which they might somehow be held responsible. In the Hospital Register, all bruises, cuts, and injuries were accounted for with a detailed description of the circumstances that had produced them. This attention to detail may have arisen from an anachronistic desire to improve safety in the workplace, but more likely stemmed from the army's requirement to determine whether or not the patient had indulged in drinking or fighting. Now it is impossible to determine which of the many injuries were due to accidents and which to unacknowledged fighting.

Doctors were aware that soldiers would not be forthcoming about their drinking or their fighting. Indeed, medical skepticism about the stories of injury is evident: more than half the causes of illness that had been rejected by doctors were the soldiers' accounts of their accidental blows and falls. Generally, however, the physicians seemed not to push the issue and simply attended to the problem at hand. Perhaps they thought that official ignorance permitted the use of diagnostic euphemism allowing them to provide medical care. For example, a soldier attended the hospital seemingly to avoid going to march because his "right calf [was] swelled and discolored as if from the effects of a blow [fight], which however he denied" (fol. 167). Similarly, a 26 year-old soldier was admitted with mild conjunctivitis, but the doctor's record indicates that when he found a cataract developing in the eye, he suspected there was something he was not being told. He wrote that the patient said he had sustained a

puncture wound of cornea a year ago ... sight in left eye in which cataract observed getting worse ... [the patient] is rather frightened and admits now that the accident which he stated occurred to his eye a year ago occurred about a fortnight after his enlistment, he says that he went down to drink at the pump and fell against the handle of it and it struck him in the eye. This story does not appear the exact truth for something has evidently punctured the cornea ... he did not report himself until 20th inst when it is probable he came more from

finding his sight diminishing than from the trifling superficial inflammation of the conjunctivae (fol. 57).

Later, the doctor observed that the inflammation had subsided, but the lens was becoming shrunken, opaque, and white, and the soldier was going blind in one eye.

The result of this analysis would suggest that the public was well informed: soldiers were hard drinkers and given to violence. Alcohol was likely to have been an even more significant cause of morbidity and mortality than first examination of the record would suggest. It is clear that soldiers attempted to direct the physician's attention away from the sources of their injuries, and that doctors were inclined to let the record reflect medical "truths" in relative terms. In this manner, the working conditions of both doctors and patients directed the content of the Hospital Register.

Causing Disease: III. Living Arrangements and Sexual Activity

SOMETIMES FAMILY ARRANGEMENTS or soldiers' worries about them were explicitly held to be a cause of morbidity. For example, when Henry Warren contracted scarlet fever the first doctor wrote that the disease was "prevalent among the children of the town and in the married men's Barracks where this soldier was quartered 2 or 3 children are at this moment labouring under the exanthem [rash]" (fol. 111). The same doctor wrote that John Deane's wife "was confined of twins about 6 weeks ago and from that time nearly to the present moment [she] has been in an exceedingly precarious state. Deane's illness is no doubt a good deal [due] to his late anxiety watching and fatigue" (fol. 118).

In several places, the physician indicated that prolonged sickness in the soldier could lead to financial or domestic hardship for his family because of reduced rations and wages. For example, the doctor wrote that James Robinson, "in having [a] wife and [a] large family [was] much impoverished by the continued stopping." Robinson asked to be allowed to return to duty; the physician consented, but did not approve (fol. 15). In Hill Wilson's case the doctor considered him "pale and weak" and "quite worn out and unfit for service"; however, when the soldier claimed he was "feeling pretty well" and "beg[ged] to be allowed on the convalescent list having a wife and 3 children," the doctor relented once again (fol. 85).

Unlike drinking or fighting, the sexual activity of soldiers seems not to have been criminalized. As has already been shown, venereal disease was openly declared to be a major source of morbidity at Fort Wellington. Doctors were vigilant about the problem and questioned men who suffered from pain on urination or penile discharge about their sexual activity. Most soldiers readily described their activities, but such an admission seems to have carried a stigma for a few who denied having incurred the risk despite flagrant evidence to the contrary. For example, the man who had had his testis incised three times for an apparent

gonorrheal condition was adamant that his problem did not stem from venery; rather, it had resulted from "exertion while on fatigue" (fol. 171).

In the record, the "cause" of venereal disease appears to have been not only the sexual behaviour of the soldiers, but also the "women" of one geographical place or another. For example, the doctor wrote that one soldier, with a prior history of gonorrhea, had "returned from detachment at Lanark a week ago and thinks he brought the disease back with him" (fol. 64). Another man with a similar history, thought that his urethral discharge "proceeded from venereal intercourse with women in this town" (fol. 74). Perhaps the doctor's intention in designating the site of the exposure was to gather cautionary information for the troops who would seek sexual pleasures when on leave.

There is no mention in the Hospital Register of treatment having been given to women for venereal or any other conditions. The absence is somewhat curious for two reasons. First, wives and children lived at the Fort and were noted to have suffered various contagious illnesses at the same time as their male relatives. Second, capitation payments to civil practitioners who provided garrison care included remuneration for women and children at a rate equal to that for officers and men, suggesting that care of families was the responsibility of the medical officer. Perhaps the medical officer did treat the families of soldiers and kept separate records, or no records at all. Or, perhaps, he relied on the town physician for their care, as the apparently close relationship between Prescott's civil practitioner, W. James Scott, and the Fort might imply. This possibility invites the hopeful (but highly improbable) speculation that the army doctor communicated to the town doctor any information about the risk of venereal disease among civilian women.

The natural tendency of syphilis or gonorrhea to flare and remit spontaneously meant that many drugs, including mercury, were touted as specific cures. On the other hand, there were no truly effective remedies. Treatment gave the men and their doctor a sense of security that can now only be described as "false." As a result, "the women" of Prescott surely contracted venereal problems from "the women" of Lanark, through "the men" of Fort Wellington, but the record is not written in this way because the problem was not conceived of in this way.⁸¹ Similarly, the scarlet fever of Prescott children was shared with the soldiers, but from the military perspective of the Hospital record, the children were the cause.

⁸¹The seeming lack of concern for women known to be afflicted with venereal complaints may emerge from as yet poorly understood medical attitudes toward gender relationships in the early 19th century. As recent scholars have shown, most work on this topic has been based on categories that may be simplistic (if not anachronistic) and on an assumption that gender became a problem only later in the century. For an essay that challenges these ideas, see Lykke de la Cour, Cecilia Morgan, and Mariana Valverde, "Gender Regulation and State Formation in Nineteenth-Century Canada," in Ian Redford and Allan Greer, eds., *Colonial Leviathan: State Formation in Mid-Nineteenth-Century Canada* (Toronto 1992), 163-91.

Venereal disease was more common and more lethal than the record suggests. For example, gonorrhea could have produced some of the eye problems and tertiary syphilis may well have been the source of the many skin ulcers, although the record did not make the connection. More seriously, and apparently unbeknownst to the physicians, venereal disease was a cause of death. Of the six men who died, two had suffered acute onset of severe chest pain and pulmonary congestion. At autopsy both were found to have isolated but extensive disease of the aortic valve of the heart, a condition now known to be associated with advanced syphilis.⁸² In other words, added to its heavy burden of morbidity, syphilis, like drinking, may well have been a significant cause of mortality among the soldiers of the garrison. Unlike drinking, which seems to have been suppressed as a cause of disease, venereal causes of some conditions (including deaths) were simply unknown.

Causing Disease: IV. Malingering

REPORTING SICK meant that the soldier could be exempt from work. When the work was considered to be undesirable, the medical officers seem to have expected that soldiers would try to escape it. Failure to detect signs of anatomical or physiological alteration suggested to the physician that his patient was not seriously ill. At times, it seemed to imply that the patient was feigning or exaggerating symptoms in order to avoid duty. In the military setting much more than in the civil, the soldier was obliged to convince the medical officer of the validity of his symptoms; in turn, the medical officer was obliged to determine the truth; both could suffer if they failed.

⁸²Clinical diagnosis of valvular disease of the heart had only recently been described. Its antemortem detection with the stethoscope remained a subject of controversy in the 1840s. Although pathologists had associated syphilis with valvular change for at least a century, it is scarcely surprising that the Fort Wellington medical officers had not suspected syphilitic aneurysm in their antemortem examinations. The postmortem descriptions and the fact that the valves were examined at all testify to the fairly up-to-date knowledge of the medical officers. The most frequent cause of valvular heart disease is now considered to be rheumatic fever, the autoimmune disease that follows streptococcal infections; both conditions occurred at Fort Wellington. Rheumatic fever, however, usually affects the mitral valve together with any of the other three heart valves. Since the men had previously been well and all their other heart valves were judged to be free of disease, it is reasonable to place syphilitic aortitis and aortic valve rupture at the top of the list of diagnostic possibilities. By the early 20th century, the causes of valvular heart disease had been categorized. William Osler cited alcohol and syphilis as causes of arteriosclerotic chronic valvular disease, and wrote that syphilis was the cause in a "very large proportion of young and middle aged men." He also recognized that the "valvulitis of rheumatism and of the fevers [was] more rarely aortic." See *Principles and Practice of Medicine*, 8th ed. (New York 1919), 809. For more on the causes and relative frequency of mitral and aortic valve disease, see Eugene Braunwald, Kurt J. Isselbacher, Robert G. Petersdorf, Jean D. Wilson, Joseph B. Martin, Anthony S. Fauci, *Harrison's Principles of Internal Medicine*, 11th ed. (McGraw-Hill 1987), 643, 957, 966-7.

Although the word "malingering" was never written, it and other types of dishonesty appear to have been considered in at least 30 patients. The first physician seems to have been most suspicious of his patients, but it cannot be determined if the earlier (pre-RCR) troops under his care were less reliable, or if the later physicians were more trusting. Doctors' doubts about their patients' stories are reflected in the record: the history was what the patient "says" or "states" (fols. 55, 70, 73, 83, 86, 92, 95, 102, 117, 126, 159). When the physical examination offered no signs, the suspicious doctor would write, "does not appear to have much the matter with him" (see for example, fols. 61, 77, 90). In a few instances, the doctor recorded more explicit concerns about the "truth" of claims and the "doubtful" or "simulated" symptoms in patients who were "not to be trusted" or were "of a very equivocal character" (see for example, fols. 57, 82, 99, 144, 167).

Nevertheless, when a patient claimed he was unable to do his duty, he was admitted to hospital for at least a day, despite the misgivings. In some cases, the doctor could cajole the patient back to work, as occurred in the case of James Grafton for whom he wrote that the "wound [on the little finger] has not healed but is altogether so trifling he admits he can do his duty" (fol. 70). However, not all physicians were so understanding about a soldier's ailments and, as a result, disagreement over the origins of illness may have occurred. For example, soldier Joseph Knee was admitted three times by the medical officers during the period of the Hospital Register for problems of ophthalmia and gonorrhea. By 1847, however, Dr. Anderson was convinced of neither the seriousness nor the origin of the man's complaint and he filed the following report: "Joseph Knee according to the report of Dr. Macdiarmid labours under Chronic Rheumatism, but I am unable to state whether the same has been aggravated by Vice, Intemperance, or Design."⁸³ If a doctor was not convinced that the patient's illness was genuine, he had to ensure his own position within the army by exposing the complaint as a fraud, or risk having the same accusation made of himself.

Conclusion

THE PORT WELLINGTON HOSPITAL Register provides a glimpse of the medical practice and health status of the men in an 1840s garrison, but it was rarely explicit about the causes of morbidity and mortality. Exploration of the causes of disease and the reasons why they may have been concealed leads to some findings about the nature of medical work in a military setting. It can also point to further reasons for the neglect of the soldier in the history of occupational health.

On the surface, most soldiers seem to have been relatively healthy. At most, only four or five men were being treated for sickness at one time, the hospital was rarely filled to capacity, and only six men died. If nearly 100 soldiers were posted at the garrison during the period of 1840 to 1846, then each man may have been

⁸³Report signed Anderson, MD. See NAC, MG 13, W.O. 97, Vol. 1189, np, Joseph Knee #760 December 1847.

treated in hospital once or twice, but the vast majority of the 393 admissions for which an outcome is known ended in discharge of the patient when he recovered from his symptoms. The military physicians practiced by the standards of their time and could, at times, be innovative. Doctors and patients alike were inclined to ascribe recovery to the medical treatment.

Deeper analysis reveals the probable causes of disease at Fort Wellington and suggests that the soldiers were sick because of soldiering. While this may not be an earthshaking conclusion, it does tend to challenge conventional beliefs that soldiers' lives were threatened mostly by battle, or that epidemic fevers were the bane of camp life. This study also suggests that the soldiers' diseases were different from those of the nearby civilians, and that the difference was because of what they did.

Among the causes of disease at peacetime Fort Wellington can be found the rigors of soldiers' work, the illicit activities of soldiers' play, including drinking and fighting, and their social interactions with a 19th-century colony. Not only illness but at least four of the six deaths were intimately related to the conditions of garrison life.

Doctors may have been unaware of the lethal extent of these connections, but this study also suggests that they could recognize the various criminal sources of illness, such as drinking or fighting, and that they sometimes contrived to produce a medical record that would favour privilege for the soldier instead of punishment. More research is needed before my observation can be strengthened from suggestion to claim.

The idea that surgeons may have sympathized with their patients and conspired to save them from the guard house or flogging could be an unusual observation, or at least an underexplored possibility in the history of military medicine. Another source indicates that a surgeon elsewhere had contributed to punishment: although he was "supposed to stop the punishment if he considered it excessive," he did so "only rarely" and in most cases would "bring [a man] round" so that the flogging could continue. In contrast, the same source tells of another surgeon who explained his opposition to flogging in testimony before the Royal Commission of 1835-36 which had been charged with considering whether or not to dispense with corporal punishment.⁸⁴

A source can tend to obscure the very past it helps to reveal. The soldier and the doctor both participated in shaping the Hospital Register. Unquestioning acceptance of the numerous cases of "dyspepsia" and "accident" or of the recorded postmortem causes of death might have concealed the etiological findings cited above. It could also obscure some tentative observations about doctor-patient interaction and about medical priorities in a military setting. Unlike all other medical practitioners in 19th-century Canada, military doctors were salaried work-

⁸⁴Laffin, *Tommy Atkins*, 109, 116-7.

ers.⁸⁵ Not only did they have obligations to the patient and to their profession, they had prescribed duties and obligations to their senior officers and the army system. But the doctor could not always serve patient, medicine, and army equally, sometimes he had to choose. At Fort Wellington, he sometimes chose to conceal the exact causes of illness behind the conceptual and historically contingent constructions of disease. In this context, the doctor's first allegiance was given to his sick patient, second to the army, and third to medicine. In serving his patient, the physician manipulated the rituals of diagnosis and treatment to satisfy the army regulations, giving only apparent conformation to the canons of medicine. If he did not believe his patient was sick, it appears that army and medicine took precedence. Therefore, formal medical practice at the garrison, its epistemology and its process, the interaction between patient and doctor, was highly controlled and subordinated to the "leviathan" of the state structure they both served.⁸⁶ Others have made similar observations about the effects of a military environment on the construction of "new" diseases during war.⁸⁷ I would add that the disease process can also be influenced by a military work environment during peace and that it was the military nature of the work — perhaps more than the conflict — that shaped the new diseases created during war.

As with all projects that seek to reconstruct the medical past, this study forces us to address historiographic questions that emerge from statistically rich material — questions not only about what the source provides, but also about what it does not, or cannot, and the reasons why. For example, I have pushed the meaning of the curiously frequent diagnosis "dyspepsia" to unravel links between society and military, and between doctors and their patients, both working within a rigid structure. But what have I missed? What questions did I fail to ask because of my own priorities? What other ideas could be lurking in the data-base of the Hospital Register that I have been unable to imagine?⁸⁸

⁸⁵For a discussion of the extent and impact of the paucity of salaried positions on the profession of medicine, see R.D. Gidney and W.P.J. Millar, *Professional Gentlemen: The Professions in Nineteenth-Century Ontario* (Toronto 1994), 85-7.

⁸⁶The reference is to the introduction of Redforth and Greer, eds., *Colonial Leviathan*.

⁸⁷Brown, "Shell Shock"; Copp and McAndrew, *Battle Exhaustion*, 150; Howell, "'Soldier's Heart,'" 34.

⁸⁸The personal involvement and agendas of historians in their projects has become an historiographic topic of some moment. On its effect in Canadian labour history and history of medicine, see David J. Bercuson, "Through the Looking Glass of Culture: An Essay on the New Labour History and Working-Class Culture in Recent Canadian Historical Writing," in David J. Bercuson, ed., *Canadian Labour History: Selected Readings* (Toronto 1987), 257-72, esp. 272; Palmer, *Working Class Experience*, 14-6. In medical history, Wendy Mitchinson, "Medical Historiography in English Canada," *Health and Canadian Society*, 1 (1994), 205-27, esp. 206-10; Sherwin B. Nuland, "Doctors and Historians," *Journal of the History of Medicine and Allied Sciences*, 43 (1988), 137-40; S.E.D. Shortt,

To return to the topic of the introduction — neglect of the soldier in the history of occupational health — this project tends to confirm recent observations that distinctions between military and civil, medical and social are falsely constructed by the interests of the scholars who study the past under specific rubrics.⁸⁹ Neglect of the soldier's health and work may in part be due to disciplinary boundaries of the late 20th century. Historians who "do" military medicine usually have different interests, priorities, and political opinions from those who "do" labour history or the history of occupational health. The history of military medicine has been pursued and constructed as being distinct from the history of occupational health; it has centered on doctors, procedures, and war. Simultaneously, the history of occupational health has excluded workers who could be directly identified as instruments of the state; in its further exclusion of professionals (salaried or not), it has tended to portray doctors as elite conservatives who fail to appreciate their patients' needs. The possibility that a meticulous document may have been composed by both the patients and their doctors in a manner that deliberately constructed, distorted, and disguised the events it was intended to record could defeat a historian with priorities in only one camp.

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"Antiquarians and Amateurs: Reflections on the Writing of Medical History in Canada," in S.E.D. Shortt, ed., *Medicine in Canadian Society: Historical Perspectives* (Montréal 1918), 1-18.

⁸⁹Cooter, "Medicine and the Goodness of War."

Table 2
Medical officers Associated with Fort Wellington, 1840s and 1850s

	Arrival	Departure	Other information
David Dyce	May 1842	Sept. 1843	d. Fifeshire, 13 Aug. 1848
Carr	Oct. 1843?	Nov. 1843?	
Alexander B. Clelland	Nov. 1843	Mar. 1845	MD Glasgow 1838; d. 25 Aug. 1853
John D. Macdiarmid	April 1845		MD McGill 1847; d. 31 Mar. 1862
Simpson	Aug. 1847		MD Edinburgh 1843; d. 31 May 1855
Robert King		1853	d. Prescott, July 1853
James Scott	1841, 1850, 1853		Dublin; license 1831; d. 14 Oct. 1875
Patrick S. Laing	Sept. 1853		d. London, 7 Feb. 1892

Table 3
Summary of the Most Frequent Symptoms in 462 Cases

General		
	weakness	27
	ague	2
	other fever	27
	chills	27
	delirium	10
Pain	total	229
	headache	65
	thorax	51
	abdomen	29
	limbs	27
	joints	18
	back	13
Respiratory		
	coughs	73
	colds	33
	sore throats	27
	short of breath	16
	spitting blood	7
Gastrointestinal		
	anorexia	19
	nausea	23
	vomiting	20
	diarrhea	22
	bleeding	14
External and skin		
	sore eyes	18
	penile discharge	17
	swelling	20
	abscesses	9
	boils	9
	ulcers	9
Injuries		
	fractures	2
	cuts	12
	bruises	11
	frostbite	3

Table 4
Most Frequent Diagnoses* in the Fort Wellington Hospital Register

Diseases	
Colds / sore throat	105
Fevers	51
Skin ulcer / boils	36
Dyspepsia	34
Ophthalmia	22
Diarrhea	21
Rheumatism	19
Gonorrhea	19
Syphilis	11
Delirium Tremens	10
Pleurisy	6
Herpes	5
Measles	5
Pneumonia	5
Erysipelas	4
Injuries	
Bruises	31
Cuts	17
Dislocations / sprains	9
Frostbite	7
Burns	4
Fractures	2

*For the purposes of this table, several variants of a single type of diagnosis have been combined and English has been used to replace some of the Latin diagnoses written in Hospital Register.

Table 5
Deaths and Autopsies at Fort Wellington, 1841-1843

Date Died	Name	Age	Hospital Stay	Admission Diagnosis	Postmortem Diagnosis
Aug. 1841	John Macdonald	40	44 d.	dyspepsia	tuberculosis
July 1841	William Dingwell	32	6 d.	sudden coughing blood / seizures	aortic valve disease
Mar. 1842	John Durkin	38	7 d.	hepatitis / ague	enlarged liver and spleen
Mar. 1842	Christopher Paling	36	1 d.	boil / delirium tremens	enlarged liver/ congested cerebral membranes
June 1842	Robert Watts	45	14 d.	acute catarrh / chest pain	pneumonia/ aortic valve disease
Aug. 1843	Henry Scott	41	4 d.	intermittent fever / seizures	pleural adhesions

Table 6
Most Frequently Used Treatments in the Fort Wellington Hospital Register

Drug	Type of drug	No. of cases treated
Calomel / Hydrargyrium submurias	PM	137
Calomel - colocynth compound	PM	79
Cathartic dose (unspecified)	P	73
Magnesium sulphate	P	73
Ipecac	E	65
Antimony potassium tartrate	E	62
Opium	A	59
Jalap	P	54
Antimonials (powders/pills)	E	48
Vesicatoires / blisters	S	38
Rhei / rhubarb	P	35
Colocynth / bitter cucumber	P	33
Cataplasm / poultice	S	33
Purgatives (unspecified)	P	31
Emplastrum cantharidis	S	31
Dover's powders (Ipecac and Opium)	EA	25
Ricinus / castor oil	P	23
Camphor	S	22
Hydrargyrium (unspecified mercurial)	M	21
Fomentations / baths	S	20

Key to Drug Type

A = analgesic or pain-killer; E = emetic; P = purgative or laxative; M = mercury; S = skin or topical