LISTER AT HOME AND ABROAD: A CONTINUING LEGACY

by

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Joseph Lister’s painstaking experiments in antiseptic lotions, dressings, and sutures in the 1860s and early 1870s seemed needlessly complex to his critics and were best understood by those who saw him in action. From the 1880s the acrimony subsided, and Lister’s international reputation became a major asset to the medical profession, even as it discarded or bypassed many of his techniques. He was claimed as an influence by many new specialties, even though in some cases his links with the discipline were tenuous. By the early twentieth century Lister had become a focus of imperial sentiment, and his legacy is seen at home and abroad through successive generations of students from his Scottish universities.

Keywords: antiseptic surgery; Listerians; British Empire; medical education

LISTER’S STUDENTS AND THEIR HEIRS: INTERNATIONAL DIFFUSION

In 1875, eight years after the publication of Joseph Lister’s first major article on antiseptic surgery, The Lancet was still publishing querulous editorials on the subject:

Until Mr. LISTER and his disciples can prove that the results of the antiseptic system are sufficient to compensate for the extra expenditure of money, time, and labour, it is certain that the minute details of antiseptic surgery will only be practised by enthusiasts who have time enough for them.¹

Notoriously, Lister’s early work in antiseptic surgery had a patchy reception. This is not surprising, because his methods seemed fussy and complex, especially to those who had not witnessed them at first hand.² His ‘germ theory’ was one of several current in Europe at the time, and his early belief that even the most perfunctory exposure to ‘germs in the air’ could cause infection led him into over-elaborate precautions.³ The carbolic spray was the most famous and controversial of these early methods. Lister gave it up in the later 1880s, but many of his disciples had already found that their surgical success did not depend on it. Even his most devoted admirers admitted that Lister’s procedures were not easy to follow.

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doi:10.1098/rsnr.2013.0031
Published online 29 May 2013
Reading his articles in the medical journals was no substitute for direct experience, as one of his former students noted:

no one who had not followed Lister at work, surrounded by his trained assistants, and personally familiarised himself with the elaborate paraphernalia and almost ‘automatised’ himself to the meticulous details could have succeeded at all.4

Because Lister continually experimented with different types of antiseptics, dressings and sutures, his ever-varying techniques could cause confusion. He frequently complained that readers ‘misunderstood’ his work because they concentrated on details of treatment rather than the underlying principle of keeping microorganisms at bay. In Rickman Godlee’s biography of Lister, the chapter on the reception of Lister’s ideas is significantly entitled ‘Misconceptions’. In particular, it was alleged, a superficial reading of Lister’s work would lead practitioners to believe that his methods relied only on a liberal application of carbolic.5

Lister’s students, having direct exposure to his theory and methods, were well placed to translate them into everyday practice, and the argument that follows relies on two cohort studies of students from the universities of Glasgow and Edinburgh. The first cohort of 1938 students produced 1288 practitioners who qualified in the late 1860s and early 1870s, during Lister’s time in Scotland, and their working lives extended roughly to the end of World War I.6 Not all became converts to the antiseptic method, although most of them did so and helped to spread Lister’s ideas in Britain and abroad. Some took academic posts in their old universities and became the teachers of the second cohort (962 students, producing 787 qualified practitioners), who were students in the decade before World War I. Lister was nearing the end of his long life by this time, but his influence was still strong, directly on his former students, many now leaders of their profession, and indirectly through their influence on their own students. His experimental approach to surgery affected these two selected groups whose careers spanned nearly a century, from the 1870s to the 1960s.

The two Scottish universities, and particularly Edinburgh, had an international reach, both as teachers of students from overseas and as training grounds for British-born students who subsequently emigrated.7 When the birthplaces of the two cohorts are compared (table 1), it is obvious that Glasgow, with an overwhelmingly Scottish student body in the 1870s, had become even more Scottish in character in the later period. By the end of the nineteenth century, new medical schools in England and Wales had reduced Glasgow’s attraction for English students, although its proportion of overseas students was higher in the second cohort than in the first. Edinburgh also had a diminished proportion of English students, although its Scottish component remained about the same. Its reputation as an expanding

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Table 1. Birthplaces of Glasgow and Edinburgh medical students (percentages).8
international centre of medical education was reflected in the large proportion of overseas students—nearly 40% of the medical school in the decade before World War I.

Most overseas students were from the British Empire, although their places of origin varied in different decades. Australians, who were a substantial group in the first cohort, were less numerous in the second because Australia, too, had developed successful medical schools in the intervening period and there was less need to seek qualifications abroad. India continued to provide a large contingent of foreign-born students, and their proportion in the student community doubled in this period, from just over 4% to more than 8%. The first cohort of Indian-born students were nearly all sons of British officers in the Indian Medical service or Indian army, with a small group of indigenous Indians, but by the early twentieth century Indian students outnumbered the contingent from British India by three to one. The expansion of British imperial interests into the Straits Settlements and the Far East, and the migration of Chinese labour to the British West Indies, also meant that students of Asian parentage were noticeable in the second cohort of students.

After qualifying in medicine, through either the universities or the Scottish Royal Colleges, many students from abroad would return to their birthplaces, and their numbers were swelled by British medical emigrants (table 2). Glasgow was more international in the destinations than in the birthplaces of its students, because more than 15% of its British-born doctors in the second cohort made their careers abroad, as settlers, administrators or military officers; the equivalent figure for Edinburgh was about 23%. The most significant clusters of Lister’s students, and later of the doctors that they taught in their turn, were in the British Empire and the wider areas of British influence. Some might travel no farther than their home towns in Scotland and England, but others would find careers in almost every part of the world, from fashionable French resorts to the Afghan frontier, to popular destinations such as Australia and South Africa, to the less predictable Chinese Treaty ports, the Malay Peninsula or West Africa. War and the changing political allegiances of the twentieth century opened further opportunities in the Middle East and in former German colonies. Lister himself confined his travels mainly to Europe, although he had an Empire-wide correspondence, and was received with acclaim when he visited Jamaica, Canada and (late

Table 2. Destinations of students after qualifying in medicine.\textsuperscript{11}

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<td>1870s (1288 students)</td>
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<td>Britain and Ireland</td>
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<td>India and Ceylon</td>
<td>3.80</td>
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<td>Australia</td>
<td>5.36</td>
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<td>Africa</td>
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<td>Caribbean</td>
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<tr>
<td>New Zealand</td>
<td>1.40</td>
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<td>Canada</td>
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<tr>
<td>Far East</td>
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<tr>
<td>other (including Europe, Middle East and the USA)</td>
<td>1.71</td>
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<tr>
<td>military</td>
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<td>1.86</td>
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in life) South Africa.\textsuperscript{10} The most favoured place for settlement abroad for young doctors in the later nineteenth century was Australasia, followed by India, but with significant numbers also in South Africa and a wide scattering elsewhere. By the early twentieth century the patterns of settlement had changed, because medical migration was highly sensitive to the varying fortunes of the countries of the Empire.

Although the second group is smaller than the first, the numbers are large enough to demonstrate an obvious shift away from Australasia to Africa as a favoured destination, mainly to South Africa but also to Rhodesia and West Africa.\textsuperscript{12} As in the nineteenth century, medical graduates of the early twentieth century sometimes emigrated to warmer climates, particularly South Africa, to improve their own health. Lister’s former students and their heirs were not, of course, taking over the colonial medical world, but they were remarkably widespread and had a significant impact on colonial medicine.

**Listerism in practice**

The students who had direct contact with Lister regarded themselves as part of an international medical experiment. During their careers, Lister’s chemical antiseptics would be challenged by the aseptic surgery favoured in Germany and Austria. Lister’s former students, particularly the specialist surgeons, developed their own systems pragmatically, often using an eclectic mixture of techniques while still claiming to have inherited the Listerian mantle. In turn, they passed on their own versions of Listerism, and their personal respect for Lister, to new generations of students. Several of Lister’s early students reached positions of authority in the Scottish universities, and the generations of students who attended these universities in the years before World War I would have been well aware of the Listerian tradition. At Glasgow the students were most likely to be instructed in surgery by Hector Clare Cameron and William Macewen, and at Edinburgh by John Chiene, followed by Francis Caird, all students and disciples of Lister. At King’s College London, Lister’s most devoted pupil, William Watson Cheyne, held the Chair of Surgery. There was also a generous scattering of Listerian ex-students as professors in the new medical schools of England and Wales and the Australasian colonies, although of course they were not all specialist surgeons. At Cambridge the first and third professors of pathology were Lister’s former students, and their contemporaries could be found occupying university posts in traditional subjects such as anatomy and midwifery, and also in newer disciplines such as ophthalmology and dermatology. Listerian ideas were spread not only by academics but also by consultants in the major hospitals, where they helped to train the next medical generation. In the developing hospitals and universities of the British settler colonies, a Scottish education and contacts made at the university were often an advantage in securing elite positions in the hospitals and in government service.

The medical patronage system in Britain, by which teachers recommended their favoured students for important posts, stretched out to the Empire. Several of Lister’s students in positions of authority in Britain were able to influence appointments in overseas medical schools. New medical specialties gave this relatively small group a long reach, as noted for German Sims Woodhead, Professor of Pathology at Cambridge: ‘His advice was constantly sought in connection with appointments to Chairs of Pathology or of Bacteriology all over the Empire, and his knowledge of all the men likely to be considered for any Chair made his advice valuable.’\textsuperscript{13}
These teachers, whether in Britain or abroad, adapted Lister’s techniques to suit their own views and the types of hospital they worked in. This can be seen in photographs of the two very different operating theatres of William Macewen in the Glasgow Royal Infirmary and of James Rutherford Morison in Newcastle upon Tyne Royal Infirmary. Both were professors of surgery, Macewen at Glasgow, Morison at Durham. Macewen, the ‘man in the white coat’, followed his own system for preventing infection. His assistants and students were dressed in white surgical gowns in the Viennese fashion, and instruments were sterilized by boiling, because Macewen followed the aseptic rather than antiseptic method for this part of his routine. Even this apparently progressive system had its throwbacks to an older tradition. In Macewen’s theatre in 1892, all present wore the white coats over their ordinary clothes, and the hospital matron, Mrs Rebecca Strong, Macewen’s formidable ally, observed the operation wearing her customary imposing jacket (figure 1). The apparent ‘modernity’ of Macewen may be contrasted with Rutherford Morison’s more traditional ways. Morison and his assistants wore surgical gowns, but as late as 1906 he was photographed presiding over an operation in which students and other observers in the theatre were still in mufti (figure 2). On the photographic evidence, neither Morison nor Macewen favoured rubber gloves while operating. Lister detested gloves, and many surgeons found that the rather stiff gloves of that period impeded their dexterity. They preferred to use a chemical antiseptic on their hands, in spite of its damaging effects on the skin. Morison remained an antiseptic rather than aseptic operator, and his development during World War I of BIPP, an antiseptic surgical padding still in use, shows a continued adherence to Lister’s principles. Both Macewen and Morison frequently stated their debt to Lister, even though their own methods diverged both from his and from each other’s.

These were some of the men who transmitted their own versions of Listerism to the next generation of students in Britain. One of the new generation of Edinburgh students, Cuthbert Esquire Dukes, took the Listerian example so seriously that he managed to write a biography of Lister in between a distinguished war service in the Royal Army Medical Corps (RAMC) and a distinguished career at St Mark’s and St Peter’s hospitals in London, specializing in the
pathology of intestinal cancer. His life of Lister appeared shortly after the heavyweight biography by Lister’s nephew Rickman Godlee—Dukes obviously felt that there was need of a more straightforward book for the layman. Although his work added little to what was known of Lister’s life, it did offer an informed appreciation of the changes in Lister’s methods, and their application in practice. Like most of his generation, Dukes believed that Lister was the father of modern ‘scientific’ surgery. Indeed, his cohort of students received their medical education at a time when Lister’s name was once more at the forefront of professional discussions. Michael Worboys has commented on the mixed feelings that the Queen’s Diamond Jubilee of 1897 and then the celebrations for the new century aroused in sections of the medical profession. Some expressed doubts on the progress and future of medical science, but in 1902, when they celebrated Lister’s 75th birthday, the profession, and particularly the surgeons, were in a more ebullient mood. Lister’s peerage in 1897 was a sign of the public recognition so long desired, and by this time more public and private money was being devoted to medical services and medical research. Inevitably, surgeons from several countries dominated the Listerian jubilee issues of the British Medical Journal and The Lancet. As the eminent French surgeon Lucas-Championnière argued, ‘the scientific basis of Lister’s surgery is so well established that all those who after him have sought to innovate or to discover have been forced … to submit to the rules which he had established.’ The surgeons were not a backward-looking group, because for many of them surgery seemed to have begun only in the late nineteenth century. After the Lister celebrations, the president of the British Medical Association tried to lay old controversies to rest by expressing the commonly held view among Lister’s admirers that there had been no break in the shift from antiseptic to aseptic surgery, but rather a ‘natural transition’. For the first cohort of Scottish-trained students, most types of practice would include surgery, because the gap between surgeon and general practitioner was not as wide as it became in the twentieth century. Nor did the first young Listarians trust the techniques of older surgical colleagues who had not embraced the antiseptic method, and they preferred...
to undertake surgery themselves rather than let their patients risk a non-Listerian operation.\textsuperscript{21} Practitioners in the Empire had little choice, because their communities were often not large enough to support many specialists, hospitals were few and scattered, and the local doctor had to operate in any emergency. The words of a former Glasgow student, George Gillon, a surgeon in Wellington, New Zealand, might stand for them all:

Out in the Colonies we meet with all sorts of cases, and have often to treat them in rough and ready ways; and, especially in out-of-the-way districts, where there is no one to call in for consultation, it behoves the colonial surgeon to be “ready aye ready,” for any emergency. The average practitioner in N.Z. has, as a rule, much more frequent opportunities for important surgical work than would fall to the lot of a country doctor in England where most cases of major operation are sent to the large centres, there to be operated on by specialists, and in hospitals.\textsuperscript{22}

Gillon was writing in 1894, at a time when the number and size of hospitals in Britain had greatly increased, and it might be expected that British surgical cases were becoming the province of the hospital consultant surgeon rather than the general practitioner. Nevertheless, there were many procedures in Britain that were still left to the GP in his surgery or the patient’s home. The obituaries of the second cohort of students, many having had their surgical skills honed by experience in the RAMC during World War I, make this clear. Well into the twentieth century, British general practitioners in poorer districts had to undertake a variety of tasks. The obituary of James Moffatt, who practised in the mining villages of County Durham from 1920 to 1958, would not have sounded odd in the previous century:

He had to accept the responsibilities of general practice in its widest sense, with minimal hospital and consultant support. It was a dispensing practice, with crowded surgeries and many visits and home confinements. He did minor surgery on the kitchen table on Sunday mornings, giving his own anaesthetics.\textsuperscript{23}

Complex cases, if they were not emergencies, would indeed be sent to the major hospitals, but in Britain, as in many parts of the Empire, the small cottage-type hospital attended by local general practitioners was the first line of surgery. In these hospitals, a Listerian dedication to the prevention of infection was of great importance.

**Lister and the New Medical Specialties**

The most widely circulated general medical journals, the *British Medical Journal* and *The Lancet*, served to keep British doctors in touch with overseas events,\textsuperscript{24} and they also reached far-flung doctors anxious to keep in touch with the latest medical and surgical developments. In Britain, the later nineteenth and early twentieth centuries were characterized by the growing numbers of specialties in medicine, and by new specialist societies and journals. Some made explicit attempts to connect themselves with Lister and to emphasize the imperial spread of their contributors. The *Journal of Pathology and Bacteriology* (now the *Journal of Pathology*) began in 1892 as an organ of the Pathological Society and was edited by German Sims Woodhead, Lister’s former student, who remained devoted to the antiseptic idea. The journal staked a British claim in a field of research dominated by Europeans, and Woodhead’s first editorial was committed to an internationalist approach, noting “the co-operation of many distinguished Continental,
American, and Colonial Pathologists’. A version of this phrase appeared on the journal’s mastheads in its early years. The first volume carried a translation of an essay by Rudolph Carl Virchow, and the second a report on research on bilharzia in South Africa. Lister’s reputation was important to the bacteriologists, to whom he gave unstinting personal support. Their most important research centre, the British Institute of Preventive Medicine, changed its name in 1903 to the Lister Institute, because Lister, the practical surgeon, was also hailed as the exemplar of scientific and laboratory-based medicine, even though his own laboratory work had been largely domestic. Contributions from the institute featured prominently in the Journal of Pathology and Bacteriology.

Lister would have appreciated the internationalist spirit of this journal, because he always acknowledged his debt to Pasteur and worked within a framework of European medical cooperation. But although doctors might subscribe to an ideal of internationalism in medicine, it was already being challenged by nationalist rivalries. By the early twentieth century, as European political tensions worsened, some of the new specialist journals were looking to British heroes, and stressing imperial rather than European unity. This change of tone was most apparent in the proudly imperialist Journal of Obstetrics and Gynaecology of the British Empire, which began in 1901. At a meeting in London in 1902 of the ‘obstetricians and gynecologists of the Empire’, Sir James Graham MD, the Mayor of Sydney, paid tribute to Lister and James Young Simpson as the founding fathers of the modern discipline. On Lister’s death in 1912, an article by a leading Edinburgh obstetrician remarked: ‘it is to Lister that we undoubtedly owe the practical application of the great principles which have robbed childbearing of more than half of its dangers’, although, no doubt aware that its previous issues had deplored the continuing high rates of infant and maternal mortality in Britain, he added, in italics: ‘when [Lister’s] principles are loyally and faithfully carried out at the bedside.’ The obstetricians could in fact lay much less claim to Lister than the bacteriologists, because antiseptic practices had made little difference to maternal mortality, though they had encouraged the development of safe surgery in Caesarean deliveries. In post-colonial days the journal dropped its imperial title and sought a more international image. It is now published as BJOG: an international journal of obstetrics and gynaecology.

Ironically, the patriotic and imperialist note resounded most loudly in the journal that represented Lister’s own specialty. The British Journal of Surgery began in 1912, the year of his death, and it duly honoured him as the greatest surgeon of all time. The journal’s title was determinedly British, but its ambitions were imperial. Rickman Godlee, in his introduction to the first number, made ‘a confident appeal . . . to our colleagues, not only in the Mother Country, but in India and the Colonies.’ Having a British figurehead to represent the whole discipline was even more important when Britain was at war, and the journal’s editorial in 1915 found it necessary to disown any German credit for modern surgery, and to argue that German ideas had contributed little:

The German mind is avaricious: it is a gross feeder, not scrupulous in its choice, nor very discriminating in its taste; it is not severely logical, nor balanced: it lacks insight and judgement, but is nevertheless large and robust. The Teuton is . . . collector rather than creator; exploiter rather than explorer.

One can only speculate what Lister the former Quaker, pacifist, internationalist and recipient of German and Austrian honours, would have thought of this.
Lister was therefore a role model for several medical specialties, and so widely was his supposed influence cited in the emerging disciplines that he seemed in danger of becoming a symbol not only for surgical progress but also for the whole range of Western medicine. One admirer even extended Lister’s influence beyond the human race. The Archbishop of Canterbury wrote, when solicited for aid in erecting a memorial to Lister in 1912, that ‘it would be difficult to exaggerate the value of Lord Lister’s services to humanity and the animal creation generally’. And indeed, some veterinary textbooks had begun to incorporate antiseptic surgery in the treatment of animals, after a slow and suspicious start.

THE ZENITH OF EMPIRE

When the second cohort of students entered their medical schools, and Lister himself was in his final decade, he was already part of a pantheon of heroes whose achievements were believed to unite and inspire the Empire. Politicians were not averse to making fairly crude claims for medicine, and particularly surgery, as a ‘tool of empire’. Two Colonial Secretaries, one prewar and the other postwar, certainly saw British medicine in this way. In 1905, the Royal Institute of Public Health feted Joseph Chamberlain, who had recently vacated the Colonial Office, in gratitude for his services to preventive and tropical medicine. Chamberlain had brought Patrick Manson to the forefront in advising the government on tropical health, and had supported the foundation of the London School of Tropical Medicine in 1899. In replying to the enthusiastic applause of his medical audience, Chamberlain referred to progress in medicine and surgery, and invoked Lister as the leading figure in both:

He did not know whether the antiseptic treatment, which had made Lord Lister’s name a household word throughout the world and gained for him the gratitude of the human race, was to be considered a triumph of surgery or of medicine . . .

Chamberlain went on to emphasize preventive health measures as essential for the maintenance of empire, because ‘the administration of the Empire was lessened in efficiency by the preventable disease to which its agents were constantly subject’. The same theme was repeated in 1921 by a new Colonial Secretary, Winston Churchill, in a letter to the Liverpool School of Tropical Medicine: ‘were I asked to select the imperial object to which a large sum of money could most profitably be devoted I should name without hesitation the research into the causes of tropical disease and into the means of prevention and cure.’

Some colonial practitioners may have taken an equally utilitarian view of the role of Western medicine, but the motives of colonial doctors varied greatly, as did the tactics of colonial administrations. The considerable effort by New Zealand governments to develop Maori health programmes contrasted with the shameful neglect of native health in a diminishing population of indigenous Australians. The Indian Medical Service at first concentrated its efforts on the health of the administration and the army but rapidly expanded its remit to wider public health issues and general hospitals, while medical missions and the private practices of British-trained doctors also helped to spread the influence of Western medicine. As noted above, by the beginning of the twentieth century these practitioners included a growing number of Indians with British qualifications. The impact of Western medicine on public health in the overseas dominions was controversial,
but it was generally assumed that Western surgery, as exemplified by Lister, was an incontrovertible benefit of empire.

Nevertheless, the introduction of Western medicine, and particularly new surgical techniques, to the countries of the British Empire was a complex issue. Many of Lister’s early students in the Indian Medical Service hoped that Western surgery would be the ultimate proof of the superiority of Western ideas over native superstition, but risky operations were to be avoided because public failure would damage the service’s reputation. David Hardiman has also described the cautious approach of medical missionaries, who feared to perform operations if they did not have adequate surgical facilities. Aseptic techniques were impossible in small and isolated mission hospitals, and suitable antiseptics could not always be obtained. A stronger push for Western medicine came later, from the succeeding generation of British-trained Indian students. Three Indian members of the second cohort became prominent in the nationalist movement, and later used their political influence to press for the expansion of Western medicine in India. The most famous of these was Sir Sahib Singh Sokhey, an Edinburgh graduate who joined the Indian Medical Service, did important research on cholera and plague, became director of the Haffkine Institute in Bombay, and, after independence, was nominated by Nehru to the upper house of the Indian parliament. He was knighted by the British Crown, but as a Marxist-leaning nationalist he was also awarded a Stalin Prize, a very unusual double honour. He became a leading figure in the World Health Organization and was one of the first to argue that India should be permitted to produce generic drugs such as penicillin to avoid the high cost of Western pharmaceuticals. Sokhey’s medical and bacteriological interests were developed in a medical school where he was taught by some of Lister’s former students. Lister’s legacy might be seen as a tool of empire, but through men such as Sokhey it could also become a tool of nationalism. They sought to spread the benefits of Western medicine more widely than the colonial rulers had done.

Long-serving British doctors working in colonial administrations had mixed fortunes. The first cohort of Scottish-trained medical students sent many representatives into an Empire in its most expansive phase; the second cohort lived through its decline. Several medical careers in the Far East came to a sudden end as medical officers, missionaries and private practitioners were forced to leave their posts in China, Malaya, Burma, Sarawak or Singapore as the Japanese advanced: four were captured and interned, and two died as prisoners. In colonies where the transition was less abrupt, medical officers had to adjust to new regimes. George Maclean, a Glasgow graduate who had been Deputy Director of Medical Services in Tanganyika, and then Director of Medical Services in Trinidad and Tobago, wrote of the need to work in cooperation with new forms of government, where there would be more lay control of health policy. Decolonization did not reduce the need for Western-trained medical administrators, he thought, because the new governments would have to take a leading part in providing health services, and needed suitably educated advisors.

**World War I**

For the first generation of post-Listerians, who graduated just before or during World War I, the experience of military service threw open the whole question of antisepsis once more,
while drawing together far-flung emigrants. Former medical students from both cohorts volunteered to defend the British Empire. The war effort drained Britain of doctors—about one-third of them had joined the military by 1916—and had a similar effect on the settler colonies. Participation was, of course, much higher among younger members of the profession. In all, 61.7% of the medically qualified male survivors in the second cohort gave details of wartime service in their Medical Directory entries, and this is certainly an underestimate. Forty-one of this group of 787 young doctors did not survive the war, and another 17 were dead by the end of 1923, mainly as a result of further military activities in Russia, through influenza or illnesses contracted while awaiting demobilization, or from the effects of wartime injuries. Most of these were in the RAMC, but another seven joined the fighting forces before they qualified in medicine and were still classed as medical students when they died. Inevitably, war service gave this generation of students much greater experience of emergency surgery. George H. Makins, President of the Royal College of Surgeons, described the newly qualified men as keen ‘to win their spurs on their simultaneous entry into the arena of active life and into the field of military service ... as a class, a little over-anxious perhaps, to wield the knife, or to join the forefront of battle.’ As the youngest, fittest and least experienced members of the RAMC, these doctors were often closest to the front line and their main duties were to organize evacuation of the wounded, to perform triage and to excise contaminated wounds deeply so that a casualty might reach the base hospital before sepsis set in. Sepsis, which they had probably never seen in British hospitals during their training, was a major threat once more, and Listerism was again hotly debated by senior members of their profession. The virtues of antiseptic practices were re-examined, although these had their limitations because of the high risk of wound infection before any medical treatment became available. One of this younger cohort, Walter Weir Galbraith, survived to become a consultant surgeon in the Glasgow Royal Infirmary. In 1916 he reported, with a senior RAMC colleague, on the treatment of gunshot injuries to the knee joint. The wounded often reached him about 48 hours after the injury, and so he had to adapt what he knew of Listerian techniques, using a new type of chemical antiseptic, eusol, to combat infection after the wound had been deeply incised, either by himself or by medical officers closer to the front. Lister’s early fame was partly due to his success in operating on the knee joint: more than 40 years later, his work was echoed on the battlefield in France. Eusol (‘Edinburgh University Solution’) was a solution of chlorinated lime and boric acid. It had been developed by another RAMC team that included a recent Edinburgh graduate, Alexander Murray Drennan, and it represented the continuing search for a suitable antiseptic for wound treatment. Until the arrival of antibiotics in World War II, doctors in combat continued to draw on a Listerian antiseptic tradition that offered some hope of a successful outcome in very unfavourable circumstances.

**Honouring Lister’s memory**

The generations of doctors who thought of themselves as Lister’s heirs sought to preserve his memory, and his links with the Empire through his students have left many traces in medical schools throughout the world. In writing this article I was conscious of how this Empire legacy had touched on my own life, although I did not realize it at the time. As a child in South Australia, a schoolward encounter between a car and my bicycle took me to the
Adelaide Children’s Hospital, where memorials to the hospital’s founders reflected the emigration of Lister’s students, both Australian and British-born, to that remote town in a colony that was about 40 years old when they arrived. Later, I attended the University of Adelaide, where further mementoes in the medical school commemorate its founders, several of them Lister’s students, who became some of its first medical professors in various specialties. Later still, I drove to work past Lister’s statue in the gardens adjacent to the University of Glasgow, in the city where Lister’s first antiseptic experiments took place. Like other universities and medical institutions, Adelaide commemorates its relations with Lister in tangible ways. I tried to draw up a list of awards and prizes bearing his name in different parts of the world, but this proved impossibly copious, and the following is merely a selection.

The first prizes came very early, some founded by Lister’s former students and admirers before his death. Although most were in surgery, this was by no means universal. The earlier awards were fairly specific in their intentions. In 1901 the Royal College of Surgeons of Edinburgh received funds from a benefactor for ‘The Victoria Jubilee Lister Prize’ to acknowledge ‘the greatest benefit done to practical surgery by any Fellow or Licentiate of the College’, and in 1909 Dr A. E. Malloch of Hamilton, Ontario, Lister’s disciple, awarded a cash prize to Johns Hopkins students for the best essay on the life and work of Lister himself. Doctors were not the only beneficiaries. The Whipps Cross nurse training school also offered a Lister prize in surgery and surgical nursing. Prizes and fellowships bearing his name are currently awarded by the Lister Institute, the British Science Association, and the Department of Surgery at the University of Toronto. The British Association for the Advancement of Science offers a Joseph Lister Award in Social Sciences for science communication, an interesting commemoration of their former President, who was sometimes accused of failing to communicate his ideas effectively in his publications. Prestigious Lister medals are given by the Royal College of Surgeons ‘in recognition of contributions to surgical science’, and also by the Society for Chemical Industry. High-scoring medical students as far apart as the universities of Edinburgh and Adelaide may win Lister medals for achievements in their surgical studies. Thus, as in his lifetime, Lister is claimed as a pioneer, not only by surgeons but also in many fields of medicine, and in former colonies that have shed their imperial administrations but still honour Lister’s medical legacy.

ACKNOWLEDGEMENT

This essay is based on collaborative work in progress with Professor Marguerite W. Dupree, University of Glasgow.

NOTES

3 For a full discussion of British and European ‘germ theory’ at this period, see M. Worboys, *Spreading germs: disease theories and medical practice in Britain 1865–1900* (Cambridge University Press, 2000).
7. For statistics on the geographical spread of the first cohort of students, see Crowther and Dupree, *op. cit.* (note 6), p. 250.
8. Source: matriculation records of the selected cohorts from the archives of the universities of Glasgow and Edinburgh.
9. Taken from comparisons between birthplaces in the matriculation albums and addresses in the Medical Directory. These figures may be subject to amendment, because not all students have been located.
10. There is a substantial collection of Lister’s Empire correspondence in the Wellcome Library, London.
11. Sources: annual Medical Directory and Medical Register, supplemented by obituary and genealogical information.
12. The names of countries here are as used at the time, hence Rhodesia rather than Zimbabwe.
37 The other two were Kumud Sankar Ray and Ambat Ravunni Menon.
38 Later renamed the Lenin Peace Prize.