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The expansion and remodelling of the London Hospital by Rowland Plumbe, 1884–1919

Amy Smith
Survey of London
The Bartlett School of Architecture
University College London
22 Gordon Street
London
WC1H 0QB

Email: amy.smith@ucl.ac.uk

The remodelling and enlargement of the London Hospital between 1884 and 1919 by the architect Rowland Plumbe modernized one of the largest general hospitals in Britain. The work almost entirely concealed the mid eighteenth-century core of the hospital and extended its footprint beyond its immediate grounds, creating a sprawling medical complex on the south side of Whitechapel Road. The transformative effect of Plumbe's work was centred on procuring sanitary and functional interiors. During an association that spanned thirty-five years, Plumbe designed well-ventilated wards, bright operating theatres, and highly specialized departments. Nurses' homes were planned to preserve discipline and respectability, forming a cluster of tall dormitory blocks connected by covered bridges. This essay, based on research for the Survey of London, considers the medical expertise, organizational principles and social values that shaped a complicated building programme to upgrade an historic infirmary into a hygienic, well-supervised and efficient hospital complex.

The London Hospital secured its status as one of the largest general hospitals in Britain in the second half of the nineteenth century. This took time. The institution traced its origins to 1740, when a group of medical men and merchants established a charitable infirmary for the relief of sailors and labourers in east London. The hospital relied for its income predominantly on donations and subscriptions, or annual payments. Subscribers earned the status of governor, and the entitlement to nominate patients for treatment.[1] The workings of the hospital were managed by a weekly House Committee. A plain hospital with 215 beds was built to designs by Boulton Mainwaring in open fields on the south side of Whitechapel Road. The central wing of 1752–9 was enlarged by the construction of east and west ward wings between 1771 and 1778. The addition of a medical college in the 1780s formalized the practical and theoretical teaching offered by the institution's physicians and surgeons. By this time, the hospital had acquired a large swathe of the neighbouring fields of the Red Lion Farm to prevent unwanted development in its vicinity.[2] The hospital was enlarged gradually to provide more beds, with additions to the east and west wings completed between 1832 and 1842. The central wing was extended westwards by the construction of the Alexandra Wing in 1864–6, followed by the easterly Grocers' Company's Wing in 1873–6.

By the 1880s, the hospital contained nearly 800 beds for more than twenty-one types of patients (for the most part organized by gender, treatment and medical condition) arranged across an historic building of extensive size and labyrinthine complexity. The hospital was supported by a large workforce, including a nursing staff of more than 150.[3] The fields that once bordered the hospital had been developed into rows of modest brick-built terraced houses, intersected by railway lines running through Whitechapel Station. Both the origins and trades of patients had also shifted owing to industrialization, the construction of the London Docks, and a boom in Jewish immigration. Injuries incurred at work were commonly received: factory workers, dock labourers, railway workers and machinists were among the patients admitted in 1881.[4] The hospital treated a range of afflictions suffered by men, women and children in what was described by its management as 'the densest and poorest district in London'.[5]

Between 1884 and 1919, the hospital was enlarged and remodelled to procure a modern, efficient and sanitary medical complex. This ambitious building programme provides an insight into the responses of an historic general hospital to shifting ideas, innovations and

specialization in medicine, surgery and healthcare, which increased the complexity of hospitals in the late nineteenth century. Ventilation was an established consideration in hospital planning, with cross-ventilated pavilion wards along the lines recommended by Florence Nightingale widely circulated and adopted from the late 1850s and 1860s. Hospitals were commonly updated by the addition of sanitary towers, separated from adjoining wards by cross-ventilated lobbies to prevent air contamination. By the 1880s the miasma or zymotic theory, which held that disease is spread by foul air, had been replaced by germ theory, the principle that disease is caused by bacteria.[6] In *English Hospitals, 1660–1948: A Survey of their Architecture and Design* (1998), Harriet Richardson noted that 'cleanliness became all but an obsession' and was facilitated by the application of hard, smooth and impermeable surfaces with rounded angles.[7] The pioneering use of anaesthetics from the 1840s and advances in sterilisation expanded the boundaries of surgery, rapidly increasing the number of operations carried out in hospitals.[8] Progress in surgical practice introduced new requirements for operating departments, such as ancillary rooms for anaesthetisation and sterilisation. The planning of hospitals was also affected by pioneering research, such as the discovery of Röntgen rays and the invention of the Finsen lamp in the 1890s. New equipment for diagnosis and treatment was installed in specialized departments powered by electricity. Innovations were circulated in specialist publications such as *The Builder*, *The British Medical Journal*, *The Lancet*, Henry Burdett's exhaustive four-volume work, *Hospitals and Asylums of the World* (1891–3), and the weekly journal under his editorship, *The Hospital*.[9] Articles frequently referred to new manufactured finishes and specialized equipment in hospital spaces. At this time, declining mortality rates in hospitals reversed the preference for treatment at home among those who could afford it, producing a growing demand for admission.[10]

In *The Architect and the Pavilion Hospital: Dialogue and Design Creativity in England, 1850–1914* (1997), Jeremy Taylor provided an overview of the multiple concerns of architects involved with modernizing historic hospitals.[11] Building programmes to upgrade hospitals with outdated premises balanced a number of practical factors, such as the condition of existing buildings, site limitations, cost and construction in phases. Hospitals were often prompted to make improvements by the emergence of problems, such as unsanitary conditions and inadequate planning. While it was common for hospitals to construct sanitary towers and ward blocks, and convert old buildings to administrative use, modernization schemes were by no means uniform. Hospitals faced 'unique sets of requirements' that commanded

ingenuity and innovation from their architects.[12] The extensive remodelling of the London Hospital offers a valuable case study which resonates with upgrading works in other voluntary general hospitals, with a few notable points of divergence.

The building programme at the London Hospital was overseen by the architect Rowland Plumbe (1838–1919), whose association with the hospital spanned thirty-five years. During this period, each portion of the hospital and its medical college was systematically altered and remodelled on modern lines (Appendix). The footprint of the hospital was extended beyond its immediate grounds by the construction of specialized departments and a series of nurses' homes. Plumbe had overall supervision of the building programme, but it was a collective endeavour guided by the House Committee and informed by experts and employees, such as the sanitary advisor Dr Louis C. Parkes, the matron Eva Lückes, and the surgeon Sir Frederick Treves. This collaborative effort followed a similar pattern to other general hospitals with outdated premises, which often invited advice from specialist architects, sanitary advisors and hospital administrators.[13] The building programme also relied on the resourcefulness of the hospital's chairman, Sydney Holland, second Viscount Knutsford, to secure donations. Like the administrators of other voluntary hospitals, Holland may have identified that presenting a 'modern image' of the hospital through rebuilding might attract donations and accomplished staff.[14]

There is little surviving fabric from this significant phase of expansion at the London Hospital due to post-war rebuilding and recent redevelopment. The main hospital building fronting Whitechapel Road survives partially, but nurses' homes, specialized departments and ward wings were demolished to provide a large site for a new hospital that opened in 2012. This essay provides an enlightening view of the size and complexity of the London Hospital at the turn of the nineteenth century, focusing on its remodelling in line with medical innovations and considerations such as sanitation, efficiency, discipline and funding. This research also sheds new light on the career of a prolific but little-studied architect with a specialism in hospital work.

Rowland Plumbe

Plumbe's association with the London Hospital commenced in 1884. The hospital had previously relied on a surveyor elected by its governors to oversee building work. From 1745 the hospital had a line of long-standing surveyors, mostly experienced and reliable

men with local connections. The only exception was Charles Barry Jr., whose 'high standing in the profession' eased his appointment in 1858.[15] Barry's elevated status was accompanied by excessive demands on his time, divided between private practice and his work as the surveyor to the Dulwich College Estate. These commitments hindered his ability to keep pace with building work around the hospital. In 1883 the hospital resolved to abolish Barry's post and to consult 'various persons from time to time instead of keeping to their own officer'.[16] Despite this declaration of an important shift in its approach to obtaining architectural advice, in practical terms the hospital returned to the earlier *modus operandi* through its association with Plumbe (Figure 1). He was born in 1838 in Goodman's Fields, Whitechapel, where his parents managed a business selling arrowroot for medicinal use. The Plumbe family had ties with the Wycliffe Chapel, a Congregational church behind the hospital in Philpot Street (Figure 2). His father, Samuel, served as a deacon at the chapel and was a friend of its minister, Dr Andrew Reed, an energetic philanthropist. It is thought that Plumbe's mother, Ann Serena, persuaded Reed to establish the Highgate Asylum for Idiots, where Plumbe's older brother was admitted as one of its first patients.[17]

Plumbe was articled to Nockalls Johnson Cottingham and Frederick Peck, and subsequently worked as an assistant to the ecclesiastical architect Frederick Clarke Withers in the United States.[18] After his return to London in 1860, Plumbe studied under Professor T. L. Donaldson at University College with notable success, graduating as a double first prizeman, and started practising as an architect from premises in the City of London.[19] Plumbe's experience and family connections probably attracted commissions for Congregational churches in North Bow and Stratford, both completed in 1867. He also oversaw interior alterations to the Wycliffe Chapel in 1873. Plumbe's association with the London Hospital might have originated in his local connections, though it is plausible that he was recommended by John Langdon Down, the eminent physician recognised for advances in mental science. Down trained at the hospital and joined its medical staff, continuing as a consultant for the rest of his career. He also served as the medical superintendent at Reed's Highgate asylum from 1858 to 1868, when he resigned the post to establish Normansfield Hospital in Teddington, a home for mentally disabled people. Down commissioned Plumbe to convert Normansfield House, a large, unfinished residence, into an asylum and to design an entertainment hall.[20] By 1884, when he was commissioned to design a nurses' home at the London Hospital, Plumbe had evidently established advantageous connections and a reputation for competence in medical circles.

Plumbe developed an extensive practice, which attracted commissions for country houses, infirmaries, schools, warehouses, factories, hotels and business premises.[21] He also worked as a district surveyor, estate surveyor, arbitrator and advisor. Plumbe's reputation in the architectural profession was marked by prestigious appointments, including his election as president of the Architectural Association (1871–2), fellow and council member of the Royal Institute of British Architects (1876), master of the Painter-Stainers' Company (1895), and fellow of the Royal Sanitary Institute.[22] An article published in *The Builders' Journal* in 1896 praised his 'busy and well justified' career, which included positions as architect for the Artisans, Labourers and General Dwellings Company, Poplar Hospital, and St Mark's Hospital.[23] By the 1880s Plumbe's practice was based at his home in Fitzroy Square, Bloomsbury, and supported by numerous assistants, as was usual in large firms. Plumbe entered into partnership with his friend Frank Morrish Harvey in 1903, followed by C. Fleming-Williams and J. C. S. Mummery in 1913.[24] Despite the assistance of his staff and partners, Plumbe appears to have retained a firm grasp over the practical minutiae of the building works at the London Hospital. Surviving letters include lengthy descriptions of the hospital, its gardens and estate, along with details of constructional methods and materials.[25] Plumbe's association with the hospital was not formalized till 1906, when he was granted the title of consulting architect and elected to serve on the House Committee.[26] At this time, he was also the hospital's estate surveyor. Plumbe's involvement with the hospital continued till his death in 1919 at the age of eighty-one. A portrait bust placed in the surveyors' office continued to preside over building activities.[27]

The most significant of Plumbe's protégés in the building works appears to have been Joseph George Oatley, an assistant in his office from 1887 to 1903. Oatley was the son of an Islington plumber and studied at the Islington School of Science and Art, the Architectural Association and the Royal Academy before taking on an apprenticeship to George Vickery in 1883.[28] In 1903, Oatley assumed the post of surveyor to the London Hospital to manage the 'efficient upkeep' of its buildings under a new works department. Oatley's signature appears on numerous drawings for alterations and extensions, implying that, like his predecessor J. A. Thornhill, he was entrusted with producing plans for minor works. Oatley's level of responsibility appears to have increased as Plumbe advanced in age. In 1918 the House Committee turned to Oatley to draw up plans for a staff hostel for the reason that he 'more than anyone else was acquainted with the needs of the hospital', but 'it was felt that no discourtesy nor unkindness must be shown to Mr Plumbe personally'.[29] Oatley

gained a reputation for hospital work and undertook commissions at Poplar, Hertford, Hitchin, Newmarket and Hove, continuing as hospital surveyor till his retirement in 1933.[30]

Remodelling and extension of the existing hospital

The first phase of building works overseen by Plumbe on the main hospital building (namely the central wing of 1752–7 and its extensions) was initiated in 1889 by the matron, who raised concerns that nurses were falling ill owing to poor sanitary conditions. Lückes corresponded on matters of nursing with Nightingale, who promoted the theory that inadequate hygiene and ventilation endangered patients and staff.[31] The matron's account of deficient conditions was supplemented by reports of blood poisoning and infected wounds among patients. For specialist advice the hospital turned to Dr Louis C. Parkes, the assistant professor of hygiene at University College London whose work *Hygiene and Public Health* (1889) had just been published to immediate acclaim.[32] Parkes was requested to analyse 'every sanitary detail connected with the hospital' and completed a detailed report in collaboration with Plumbe, working on an honorary basis.[33] The construction of a large front extension to the central wing promised to obviate a number of deficiencies. The central wing had an impractical stepped public entrance and a double-height chapel, which obstructed corridors on the upper floors and diverted passers-by into the wards. Another inconvenience was the outdated operating theatre in the attic, which was ill-equipped to accommodate the rising number of operations and sterile surgical techniques.[34]

A three-storey front block erected in 1890–1 by the reputable builders Perry & Co. of Bow addressed these deficiencies, with the additional boon of forming a dignified public entrance fronting Whitechapel Road (Figure 3). A five-bay arcade served as a porte cochère for horse-drawn ambulances, with a sloped approach at each end and a central stepped entrance for pedestrians. The principal storey of the front block was occupied by a new chapel, expressed externally by round-arched traceried windows. The composition was flanked by a pair of four-storey pavilion towers with pyramidal roofs and crowned by a pediment with a clock. The main entrance to the hospital opened into a vestibule leading to a cross-ventilated hall, adjacent to a waiting room, an examining room and a receiving room for the accident department. A central light well lined with white glazed bricks secured a source of natural light. The transferral of the chapel to the front block provided space for a new operating suite, theatres and staff offices in the central wing.[35] A significant innovation in the operating suite, influenced by plans suggested by the surgeon Treves, was the inclusion of

an anaesthetic room to relieve patients from entering the theatre in a conscious state. More than 1,000 operations were carried out in the modernized operating suite each year, under the inspection of students perched in tiered seats.[36]

Parkes's sanitary report contained several recommendations, of which only the most critical were carried out promptly. The east and west wings were extended by the construction of sanitary towers containing baths, water closets and sink rooms on each floor. The old brick sewers were replaced by a new drainage system composed of salt glazed pipes with manholes and traps. Parkes also recommended the insertion of Tobin's tubes to improve ventilation in the old wards, along with sash and hopper windows, and enlarged fireplace flues.[37] The cleanliness of the wards, theatres and corridors was improved by the application of impermeable and easily cleaned surfaces such as glazed tiles, mosaic floors and linoleum.[38] Parkes was invited to examine the improvements in 1893 and concluded that the work was 'exceedingly well done'.[39]

The front extension and sanitary improvements represented the first stages of an extensive building programme, which advanced to the remodelling and enlargement of the main hospital building between 1899 and 1905. An increase in the number of assistants in Plumbe's office coincided with this crescendo in the building works. The precise nature of their contribution is not clear, but their appointment hints at the demands on Plumbe's practice.[40] This ambitious task was also propelled by the fundraising abilities of Sydney Holland, who had been elected to the chairmanship of the hospital in 1896.[41] In the following year, the Prince of Wales Hospital Fund (later known as the King's Fund) offered an annual subscription of £5,000 with the proviso that the hospital would spend £100,000 of its capital on making its buildings 'up-to-date and efficient'.[42] The predicted expense of £370,000 was described as 'huge but absolutely necessary expenditure', but it was calculated that the final cost reached nearly £410,000.[43]

The hospital determined that the building programme should not diminish its work, and decanted patients into temporary structures. It was not unusual for construction works to be phased and carefully organized around the activities of existing hospitals, or for urban hospitals to relocate to temporary sites. For example, St Thomas's was transferred to a converted music hall in the 1860s.[44] The London Hospital had the advantage of large grounds with enough space for temporary buildings, a less costly option than acquiring

buildings for relocation. In 1898–9, a single-storey iron building was assembled by the Bermondsey builder William Harbrow in the hospital's rear gardens, containing wards for ninety-eight patients and space for the photographic, X-ray and light departments. A similar shed was constructed for the outpatients' department in 1899–1900 by Humphreys of Knightsbridge, a leading supplier of prefabricated iron hospitals.[45] Despite such measures, the difficulty of managing a busy general hospital in the clamour and confusion of severe and unremitting building works is manifest in Lückes's personal letters. In 1904, she described that 'the daily and increasing work of the hospital […] has to be carried on under constantly varying conditions'. Not surprisingly, Lückes also remarked that she would 'be glad when the workmen disappear and the whole scheme is complete', yet conceded that 'each alteration and addition is a distinct improvement'.[46]

Only a short time after the remodelling and extension of the central wing, significant alterations were undertaken in this part of the hospital by Perry & Co. between 1900 and 1903. Spacious top-lit open-well staircases were inserted at the east and west ends, connected by a corridor (Figure 4). Each staircase lobby contained separate lifts for passengers and dead bodies, along with sink rooms and water closets. The walls of the wing were strengthened and underpinned in preparation for two new storeys, raising the hospital to five storeys. The new third floor provided one large operating theatre for teaching demonstrations, four operation rooms and adjoining anaesthetic rooms, with skylights and north-facing windows for an even light (Figure 5).[47] The walls and ceilings of the corridor and theatres were lined with Opalite, a smooth, impermeable finish, and the floors were covered with terrazzo with rounded angles. The operating theatre contained a student gallery, faced with marble and approached via separate staircases from the corridor. The operating department was supplied with sterilized air and boiling water from basement plants, and fitted with electric lighting, fans, and emergency lamps powered from the local authority mains.[48] Only one operating theatre and three operation rooms were intended initially, but a modification to the building contract secured another operating room and anaesthetic room. This alteration may have been facilitated by Benjamin Wolfe Levy, a Jewish businessman who donated the £13,000 cost of the operating department.[49] The increased size of the department reflected the sharp rise in the demand for surgery, with 420 operations performed at the hospital in 1881, 1,114 in 1891, and 2,711 in 1901.[50] A flat roof held water tanks with a capacity of 10,000 gallons, approximately a day's supply for the hospital.[51]

The east and west wings of the main hospital building also acquired two new storeys between 1901 and 1905, constructed by Perry & Co. The upper floors of the east wing were equipped with new wards, a kitchen and dormitories for the nursing staff, while the removal of the laundry provided space to convert the basement into porters' accommodation. The heightening of the west wing secured an entire floor devoted to Jewish patients, with four wards divided by a lobby containing a kosher kitchen.[52] The outpatients' department in the basement was replaced by an ophthalmic department, isolation rooms and padded rooms for psychiatric cases.[53] Although the external appearance of the westerly Alexandra Wing was not altered substantially, its interior spaces were remodelled with the addition of a coroner's court, a massage department, a maternity department, and administrative offices. The easterly Grocers' Company's Wing witnessed comparatively modest alterations, including the addition of surgical wards and south-facing ward balconies.[54] The application of sanitary finishes to hospital spaces did not entirely repress decorative touches. A gynaecological theatre had terrazzo flooring and walls coated with impervious cement and Opalite, the lower part coloured electric blue beneath a brown dado rail. The ceiling was coated with thin metal sheeting adorned with coloured enamelled decoration, produced by the Emdeca Company.[55]

The remodelling of the main hospital building included the upgrading of wards, with extensive changes carried out to improve sanitary conditions and the comfort of patients (Figure 6). Many alterations were focused on light provision. Gas lighting was installed in all of the wards by 1897, and electric lighting followed swiftly.[56] Windows were enlarged and installed with Luxfer glass, a new type of glass moulded with narrow horizontal ribs that refracted natural light into the depths of a room. This innovation was patented by the British inventor James Pennycuick and marketed by the Chicago-based Luxfer Prism Company from 1897. The glass was immediately popular in commercial premises across the United States and internationally, yet also installed in hospitals, factories and schools. The company's catalogue claimed the glass provided a 'pure, healthful light' which caused 'noxious vapors, dirt and disease [to] give way', and also promised to reduce expenditure on artificial light.[57]

Ventilation was also a focus for alterations in the wards. The east and west wings originally contained double (or back-to-back) wards separated by spine walls, and openings were inserted to provide natural cross-ventilation (Figure 4). Many wards were fitted with

balconies, providing patients with a source of natural light and diversion during their convalescence. This addition reflected a growing confidence that exposure to sunshine and fresh air was beneficial to patients, which led many hospitals to install balconies, verandas and terraces.[58] The cleanliness and practicality of the wards were also improved by redecoration and new furnishings. The walls were replastered, repainted and coated with Opalite, and the floors were covered with linoleum.[59] Iron bedsteads were discarded for higher metal beds with rests and over-bed tables, better suited to the comfort of patients and the performance of physical examinations, and a 'blue board' was reserved for medical notes. Dressings were stored in plate-glass cabinets.[60] Despite the emphasis on hygienic surfaces, the wards were often decorated with plants and flowers. For Lückes, fresh flowers were one of the 'finishing touches' that produced an impression of 'homeliness' and were 'conductive to the welfare and comfort of those whose home is the ward for the time while they are living in it'.[61]

Specialized hospital departments

The remodelling of the main hospital building was accompanied by the construction of specialized departments in quick succession, including an isolation block (1899–1901), an outpatients' department (1900–2), and a laundry (1902–4). As Burdett had pointed out, these departments were suited to separate and substantial purpose-built blocks.[62] Their transferral also secured additional space in the main hospital building. This programme of expansion was assisted by the hospital's significant estate, which extended southwards from Whitechapel Road to Commercial Road. Many large urban general hospitals, such as St Thomas's (driven out by the railway) and the Middlesex Hospital (extended after the purchase of near by buildings, and later rebuilt), were forced to relocate or acquire new buildings for expansion, but the London Hospital was in the fortunate position of possessing large grounds and an estate under its management.[63] The hospital had started to offer ground on building leases to supplement its income from 1787, initially restricting development to the west side of its estate beyond New Road. Building development directly behind the hospital commenced gradually from 1808. Modest terraced houses were constructed in an orderly grid of wide, airy streets that preserved open spaces around the hospital. From the late 1890s, the hospital reclaimed portions of its estate to provide sites for new departments and staff accommodation.[64]

This stage of the building programme gained financial support from wealthy benefactors, largely due to Holland's connections, bravado and persuasive advocacy of the hospital. Holland's fundraising talents earned him the nickname 'Prince of Beggars': he circulated facts, corresponded with potential benefactors, returned meagre cheques with demands for more money, and introduced clever tactics such as collection boxes in railway stations.[65] Despite attracting donations from businessmen, dignitaries, landowners and institutions, the works proceeded in an economical and practical manner. Utilitarian red-brick blocks incorporated sanitary towers, large windows and glazed brick plinths, though they were not devoid of embellishment. The laundry was decorated with shaped parapets and diaper brickwork patterns, and the main entrance to the outpatients' department was crowned by a shaped gable with a gauged brick cartouche. Sanitary towers were capped with pyramidal roofs adorned by finials. The repetitive use of decorative motifs ensured continuity between the hospital buildings, producing a unified institutional appearance. Although Plumbe's work transformed the footprint and external appearance of the hospital, limited resources were concentrated on procuring functional, efficient and sanitary spaces.

Isolation Block

The expansion of the hospital beyond its immediate grounds began with the construction of an isolation block, designed to accommodate patients with infectious diseases such as diphtheria, erysipelas, measles, septicaemia and scarlet fever. Isolation wards conveniently removed patients with contagious diseases from the general wards.[66] The House Committee had aspired to construct a purpose-built isolation block for many years, but the scheme faltered due to a lack of funds. From the 1870s isolation cases were placed in makeshift accommodation, including a lodge in the hospital forecourt and a detached residence for the hospital chaplain in the rear gardens. Plans for an isolation block were revived after a donation from John Ashton Fielden, a West Yorkshire landowner and philanthropist who covered the entire cost of the building project.

The planning of the isolation block was shaped by close attention to sanitation and the separation of different types of cases. For an awkward site at the east of St Philip's Church in Oxford Street (now known as Stepney Way), Plumbe devised a tall and narrow four-storey L-shaped block with a robust red-brick exterior (Figure 4). The internal configuration followed the principles illustrated in model plans for isolation hospitals published by the Local Government Board, with airy lobbies between the wards and supervision secured by

nurses' offices.[67] The west side of the block incorporated two sanitary towers with water closets, sink rooms and bathrooms on each floor, separated from the wards by cross-ventilated passages. The ground and first floors contained wards for erysipelas and cellulitis patients, with ancillary rooms used as single wards, sculleries and nurses' offices. The upper floors were divided into smaller wards and single wards for doubtful cases and children with diphtheria and measles. As was customary, there was strict division between male and female cases, and different types of disease. At its completion in 1901, the isolation block contained approximately fifty patient beds. The south end of the block contained nurses' bedrooms, accessed by a separate entrance.[68]

Outpatients' Department

The remodelling of the main hospital building included plans to improve the 'cramped, dark and badly ventilated' basement rooms occupied by the medical and surgical outpatients' departments.[69] A number of schemes were mooted, and a donation from the shipping magnate Alfred Yarrow secured funds for a highly specialized purpose-built block. The new outpatients' department (1900–2) was located to the west of the main hospital building on a large site in Oxford Street formerly occupied by terraced houses (Figure 4). This substantial block was constructed by the Bermondsey builder William Shepherd, who was boosted by the decision not to invite Perry & Co. to tender on the basis that the firm 'had as much work in hand for the hospital as it was possible for them to get through'.[70] At its completion, the outpatients' department claimed to be the largest building of its kind in Britain (Figure 7).

The outpatients' department was planned meticulously to ensure a continuous, efficient and organized flow of patients from arrival to exit, following the sequence that was firmly established in general hospitals and dispensaries. The necessity of ensuring a logical and orderly flow of large numbers of patients was shared by outpatients' departments at most general hospitals, but applied on an impressive scale.[71] The main public entrance admitted patients into a vestibule with registration offices for new cases and ticket offices for returning cases (Figure 8). Patients were directed to a large, bright and airy waiting hall, which rose to an open steel-framed roof with a lantern and clerestory windows. This space was furnished with a refreshment bar, drinking fountains, and rows of benches for as many as 1,000 patients (Figure 9). The hall was flanked by the medical department to the west and the surgical department to the east, both comprising two separate suites with a clear

division between male and female patients, and new and returning cases. Patients collected prescriptions from a dispensary on the north side of the waiting hall, adjacent to the exit. A lift and staircases descended to a pharmaceutical laboratory, which produced medicine for the entire hospital.

The remainder of the building was devoted to specialist treatments, including the aural, dental, obstetric, massage, ophthalmic, photographic, light and electrical departments. These divisions were equipped with medical innovations, such as the use of Röntgen rays for radiography. The light department contained the first Finsen lamp to arrive in Britain, used for the treatment of conditions such as lupus vulgaris.[72] The need for bright spaces, sanitation and a logical separation of patients also shaped the configuration of the upper floors, which were punctured by light wells and skylights over the ground-floor medical and surgical departments. Waiting, consultation, operation and recovery rooms for male and female cases skirted the perimeter of each floor to maximise light. The basement contained the bath department, which had Turkish baths, medicated baths, and rooms for the Tallerman treatment, a novel method of administering 'superheated dry air' to relieve rheumatism. A tunnel was constructed beneath Turner Street to secure a direct link for staff and the transferral of medicines to the medical college, and onwards to the rest of the hospital complex.[73]

Laundry

Light, sanitation and efficiency were also important considerations in the planning of the laundry. This department was formerly installed in the basement of the east wing, comprising several rooms assigned to the discrete stages of washing, wringing, drying and ironing. The remodelling of the main hospital building facilitated plans to relocate the laundry to a separate building, where its 'thudding engines and hissing steam' would not impede the recovery of patients.[74] Burdett had observed this outdated arrangement was 'fraught with danger, owing to the extreme difficulty of preventing the steam, laden with organic impurities, from ascending to the wards'.[75] A site in Oxford Street, within close proximity of the hospital's grounds, was acquired for a laundry to process 10,000 items every day for the hospital and its staff. Despite mechanization, with the installation of washing machines, ironing machines, hydro-extractors and other equipment, the department relied on approximately seventy-five laundry maids in the years after its completion.[76]

The main body of the laundry was concentrated into a single-storey top-lit workshop, divided by glazed partitions into three equally sized parts: a staff washing room, a hospital washing room, and an ironing room (Figure 4). These large, bright rooms were lined with white glazed wall tiles and equipped with machines. Taller brick-built ranges fronted Oxford Street and Newark Street. The two-storey north range was assigned to sorting laundry: dirty items arrived at a receiving room on the ground floor and processed items were sent to a first-floor distribution room. The four-storey south range was divided between nurses' training rooms and the laundry, which had rows of drying horses on the ground floor and another ironing room. The movement of bed linen, staff uniforms and other items around the hospital was facilitated by the use of wheeled crates (Figure 10).[77]

Nurses' homes

The building programme also witnessed an expansion in staff accommodation at the London Hospital, marked by the construction of purpose-built residences for an increasing volume of nurses. The configuration, amenities and decoration of the nurses' homes point to similarities with other types of residential institutions of the period, which have been examined by Jane Hamlett in *At Home in the Institution* (2015) and other writings.[78] The allocation of a small individual bedroom to each nurse ensured privacy, one of the values of middle-class domesticity and a commodity that was perhaps increasingly expected.[79] Hamlett has observed that private rooms in residential colleges and schools were 'often cherished and carefully arranged', with objects representing the occupant's identity and aspirations.[80] A photograph of a sister's bedroom at the London Hospital depicts a cosy space with trinkets, portraits, flowers and chairs for small gatherings (Figure 12), but, as no other images of nurses' bedrooms have come to light, it is not possible to establish whether it is a typical example. An assortment of comfortably furnished communal rooms compensated for the meagre size of bedrooms, while providing spaces for socialising or pursuits such as reading or playing the piano.[81] Points of arrangement in the nurses' homes at the London Hospital also correspond with Hamlett's observation that 'material structures and spaces [in residential institutions] were powerful forces for control'.[82] The construction of covered bridges, the provision of visiting rooms, and the distribution of sisters' bedrooms indicate that a degree of surveillance over the nursing staff was enshrined in the planning of their residences.

The advantages of providing nurses' homes within and adjacent to the hospital's grounds were advocated by Lückes.[83] She was only twenty-six years old when she assumed the post of matron in 1880, yet impressed the House Committee with her ideas for raising the standard of nursing.[84] Prior to Lückes's arrival at the hospital, most of its nurses were drawn from the working classes. They had limited training and a status equivalent to servants. The 1871 census recorded fifty-two nurses and twenty-three night nurses, all of whom were British, and around half born in Middlesex. The average age of the nurses was forty-three years. Just over half were widowed, and few were married.[85] At this time, nurses' sleeping quarters were dispersed around the hospital in attics and ward lobbies. Such living conditions for nurses were customary in general hospitals, but detached nurses' residential blocks became increasingly common from the 1880s.[86] The first purpose-built residence at the hospital, later known as 'Old Home', was constructed in 1875–6 to provide nurses' dormitories, recreation rooms, and apartments for the matron and the steward. Despite this substantial addition, it remained common for nurses to use a bed at different hours between shifts. It is thought that only one bath was allocated to the nursing staff at this time.[87]

The nursing system at the London Hospital was reformed under the guidance of Lückes, propelled by her vision for professionalism, education, efficiency and good health among her staff. Lückes instigated a course of lectures in physiology, anatomy and nursing for probationers in 1881, published as *Lectures on General Nursing* (1884). The elevated responsibilities of sisters were set out by Lückes in *Hospital Sisters and their Duties* (1886). She also established a training school for aspiring probationers in 1895, inspired by a similar model at Glasgow Royal Infirmary.[88] The impression of the nursing staff afforded by the 1911 census indicates that Lückes recruited a significantly larger body of nurses, many of whom were younger. The census recorded 446 nurses, with an average age of twenty-eight years. Lückes prohibited the employment of married women, and there were only seven widows. The origins of the group were more varied, with a handful of nurses hailing from countries such as Denmark, Germany, Holland and Switzerland. A few nurses had been born to British subjects in more distant countries, including Canada, New Zealand, India and China.[89]

The provision of nurses' residences was an integral component of Lückes's efforts to raise the standard of nursing. Lückes appears to have shared Nightingale's instinct that the 'degeneration' of 'nurses who live on their own foot' was 'incontrovertible'.[90] Four nurses'

homes were constructed on or adjacent to the hospital's grounds between 1884 and 1919, forming a sprawling nurses' quarter (Figures 2, 4 and 11). Covered bridges extended between these tall, plain brick-built blocks to prevent nurses from venturing out into the streets or having to climb several flights of stairs to access bedrooms, ensuring safety, convenience, and protection from bad weather. The planning of the nurses' homes was also shaped by the necessity for supervision. Surveillance was an established concern, which had influenced the arrangement of Old Home in the 1870s. A House Committee report noted that the matron's apartments would ideally be positioned 'in immediate proximity' to the nurses' dining and leisure rooms to secure 'incidentally and without any appearance of intrusive watchfulness, that guarantee for propriety of conduct'.[91]

Despite the shift in the origins and education of nurses, careful planning to ensure obedience and discipline persisted. Bedrooms allocated to sisters were interspersed between nurses' bedrooms to secure a degree of supervision. The preservation of so-called 'hospital manners' among subordinates was one of the duties undertaken by sisters, who were advised by Lückes's textbook that 'all evidence of frivolity must be sternly repressed, as wholly unsuited to the surroundings and unworthy the wearer of a nurses' uniform'.[92] Familiarity with the nurses also ensured that issues such as exhaustion and illness were reported quickly.[93] The hierarchy of the nursing staff was visible in the allocation of larger bedrooms with fireplaces for sisters. Their cotton uniforms, designed by Lückes with advice from Treves on ensuring comfort and circulation, were also signifiers of rank. These practical uniforms designed on rational lines, with removable sleeves and high laundering temperatures, incorporated differing colours and caps to denote status.[94] Subtle variations between the different tiers of staff were apparent in the selection of furniture for dormitories. In the Alexandra Home, the nurses' rooms were decorated with bedside carpets and bespoke furniture from James Shoolbred & Co. of Tottenham Court Road. In contrast, housemaids had to make do with readymade items for their basement rooms.[95]

Lückes also emphasised the importance of allotting an individual bedroom to each nurse. She advised that 'separate apartments, however small, are absolutely essential, both on grounds of comfort and discipline' (Figure 12).[96] Lückes repeatedly stressed the need for extra beds. She complained to the House Committee in 1892 that the nursing staff of 217 exceeded the number of beds by sixteen. After eighteen months, the number of nurses had risen to 275 with no significant increase in the provision of beds. In 1899, it was calculated

that fifty-seven nurses were sleeping in lodgings beyond hospital grounds, many occupying twin rooms divided by a curtain. Lückes revisited the issue in 1904, when she reported that fourteen nurses were sleeping in the bedrooms of other nurses while they were on duty.[97] Despite the emergence of a distinct nurses' quarter, many continued to sleep in the main hospital building. After its remodelling and enlargement, the attics of the front block, the east wing and the Grocers' Wing provided bedrooms for nurses, while trainee midwives and maternity staff had bedrooms in the attics of the Alexandra Wing. Although these nurses were remote from the amenities enjoyed by their counterparts in the dormitory blocks, they were close to the operating theatres and wards.

The first major addition to the nurses' accommodation during Lückes's incumbency was an extension to Old Home, built in 1884–7. This tall six-storey block conformed to the austerity of the earlier hospital buildings, with decoration restricted to iron balconies and crow-stepped gables. The block established a broad pattern for nurses' accommodation at the hospital, and was even visited by the architects Simpson & Duckworth to inform plans for a nurses' home at Blackburn Infirmary.[98] It was accessed directly from the east wing to avoid the necessity of venturing into the gardens. For the first time, small individual bedrooms for approximately 100 nurses were provided instead of communal dormitories. Water closets, sinks and bathrooms were installed on each floor, confined to a sanitary tower. The communal dormitories in Old Home were converted into sitting rooms, visiting rooms, and separate dining rooms for sisters and nurses (Figure 13).[99] This addition was followed in 1895–6 by the Alexandra Home, accessed via a covered bridge. Approximately ninety compact bedrooms were arranged over six storeys, and a nurses' sick room was provided on the ground floor. A projecting sanitary tower contained bathrooms, water closets, sinks, and fire-escape staircases.[100]

The Eva Lückes Home, so named to commemorate the twenty-fifth anniversary of the matron's appointment, followed the formula established at Old Home and the Alexandra Home on a monumental scale. This sprawling five-storey block of 1903–5 was positioned on the south side of Oxford Street, beyond the hospital's immediate grounds. The clearance of terraced houses secured an extensive site for a residence with more than 270 bedrooms, accessed via a covered bridge. On the ground floor, an entrance porch opened into a dignified entrance hall with an enquiry office. The adjoining rooms in the north range were devoted to the leisure of the nurses and the sisters, who were allocated a visiting room, a

sitting room and a writing room. The south range and the upper floors were divided into individual bedrooms for nurses, interspersed with sisters' bedrooms. Tea-points in the corridors compensated for the omission of fireplaces in the nurses' bedrooms. The nurses also had iron lockers and box rooms in the attic. The basement contained servants' quarters, comprising small individual bedrooms and a communal sitting room.[101]

Edith Cavell Home was the final nurses' home overseen by Plumbe, after he assumed the role of consulting architect to the hospital. The external focus of this six-storey block of 1915–18 was a pedimented stone porch with neo-Baroque flourishes, differing markedly from the plainer manner adopted elsewhere and perhaps the consequence of delegation by Plumbe, who was then in his late seventies. Another influence might have been the emergence of dignified residential blocks at other general hospitals, such as University College Hospital and the Royal Victoria Infirmary in Newcastle. Edith Cavell Home occupied a narrow site on the east side of East Mount Street, and was accessed from Old Home via a covered bridge. Construction by Perry & Co. was severely disrupted in 1917, as the War Office took joiners from both the hospital and the contractors for military service. Increased wages, higher than those paid by the Ministry of Munitions, were offered to workmen to prevent any further depletion of the workforce. At its completion in 1918, the residence provided approximately 120 bedrooms for nurses and sisters. An innovation was the inclusion of hair-washing rooms on each floor, a luxury introduced contemporaneously in an extension to the Alexandra Home. It was named in memory of Edith Cavell, the British nurse executed in October 1915 for assisting the escape of allied soldiers from German-occupied Brussels. A plaster bust of Cavell, who had trained at the London Hospital, was placed in a large and comfortably arrayed sitting room on the ground floor. Other leisure amenities included a visiting room and a library.[102]

In her writings, Lückes also emphasised the value of exercise and fresh air. She reminded her staff that 'nothing but some recreation daily can supply the energy needed for the vigorous performance of the daily duties' and discouraged the 'disinclination for going out which is rather apt to become chronic with some nurses', either from exhaustion or over-absorption in hospital work.[103] Lückes perceived that outdoor excursions raised the efficiency of staff, a principle shared by Burdett, who remarked that exercise was 'essential to their health and consequently to the well being of the whole establishment'.[104] In 1898, the acquisition of a site for the laundry brought a public garden under the control of the

hospital, which was devoted to the enjoyment of the nurses. Known affectionately as 'the Garden of Eden', the nurses' garden contained loose planting arranged around a grassy hillock and a pond with a 'rustic bridge', along with a fountain and seating.[105] Although the garden was an important amenity for the relaxation of the nurses, a brick boundary wall with a locked gate ensured that it was a private and circumscribed space. Nurses were permitted to collect a key from the hospital, which fitted the locks for the garden and a private entrance to St Philip's Church.[106]

Conclusion

The building programme supervised by Plumbe at the London Hospital updated an historic infirmary into an efficient and hygienic medical complex. Every part of the hospital was systematically extended, rebuilt or remodelled to provide functional interior spaces in line with the sanitary requirements of a modern hospital. This essay takes a broad view of modernity in the hospital, which included the renovation of wards, the construction of specialized departments, the installation of novel technology, and the circulation of patients and hospital goods. The hospital was complicated not only in size and configuration, but by nature of its building type. A mixture of public and private spaces included receiving rooms, waiting halls, gardens, nurses' bedrooms and offices. Many hospital spaces are not so easily categorised. Wards contained rows of beds screened by curtains for privacy, but convalescing patients were monitored by staff and exposed to visiting hours. Operations in the demonstration theatre were overlooked by a student gallery. Public and private spaces in the hospital also contained a mixture of decoration and furnishings: hygienic operating theatres had minimal embellishment and wards were often adorned with homely comforts such as flowers, while the nurses enjoyed comfortable leisure spaces with books, pianos and artwork for their recreation and improvement.

The remodelling of the London Hospital integrated ideas and principles used by other general hospitals seeking to upgrade outdated premises, but there are significant divergences from the 'basic formula'.[107] Taylor has examined the 'pavilionization' of historic hospitals, which commonly added ward blocks in line with Nightingale's widely circulated advice on ventilation.[108] Old buildings were frequently converted to administrative or residential uses, and specialized departments transferred to purpose-built ancillary blocks. At the London Hospital, it is notable that the main hospital building continued in medical use with a mixture of receiving rooms, wards and operating suites, along with staff

dormitories, offices and a chapel. The addition of a front block and two storeys provided space for new wards, kitchens and an operating department designed on modern lines. The spine walls between the double wards in the east and west wings were pierced to secure a degree of natural cross-ventilation, the hallmark of the pavilion typology.[109] There is no evidence that this unconventional approach to the retention of an old medical building was a cost-saving strategy. The initial estimate of £370,000, averaging at approximately £463 per bed, did not undercut the price of remodelling works at other general hospitals, and the estimated expenditure was even higher.[110]

In other ways, the remodelling of the London Hospital conformed with the pattern of upgrading programmes at other general hospitals of the period. A wide range of knowledge was integrated from the sphere of hospital planning, including expert advice and ideas circulated in specialist publications. New products and innovations were also installed, from Luxfer glass patented in the United States to the Finsen lamp from Denmark. Plumbe's grasp over the building works is manifested in his letters, which suggest a fastidious and pragmatic nature. Yet it was also a collaborative effort which relied on the energies of the hospital's staff. The object of this collaboration was to ensure that one of the largest general hospitals in Britain operated on efficient and modern lines. The circulation of large numbers of patients, medicines, and laundry was facilitated by the sophisticated planning of specialized departments. Wards were renovated and redecorated, while the addition of balconies reflected a growing belief in the beneficial effects of fresh air and sunlight.[111] Discipline, respectability, education and good health among the nursing staff were safeguarded by the construction of successive nurses' homes. Careful planning ensured incidental supervision, while improved conditions, training and leisure amenities were introduced for an extensive nursing staff composed of a new type of young, professional woman.

Efforts to improve the functionality of the hospital extended to the execution of the building works. The contracting firm Perry & Co. succeeded in winning a number of tenders, but were barred from quoting for the large outpatients' department to prevent overreaching. Despite making such allowances for its main contractor, the hospital declined to restrict the volume of patients during the building works. Wards were systematically decanted into temporary iron buildings assembled on the hospital's gardens, forming a sprawling medical complex in a state of constant transition. Considered in its entirety, the remodelling and

extension of the London Hospital under Plumbe's supervision was an intricate and ambitious task that reflected not only the requirements of a large general hospital in an urban district, but the considerations of a public institution aspiring to convert an historic building into a sanitary, functional and modern complex for the twentieth century.

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Appendix. Main building works overseen by Rowland Plumbe at the London Hospital

Date	Description
1884–7	Extension to Old Home
1886–7	Chaplain's house
1886–8	Enlargement and remodelling of the medical college
1895–6	Alexandra Home
1898–9	Extension of the medical college
1890–1	Front block extension, remodelling of the central wing and sanitary improvements
1891	Shelters in the rear garden and the forecourt adjoining Whitechapel Road
1898–1900	Temporary iron buildings
1899–1901	Isolation block
	Post-mortem department
1900	Gynaecological theatre
1899–1905	Remodelling and extension of the main hospital building
1900–2	Outpatients' department
1902–4	Laundry
1903–5	Eva Lückes Home
1909	Works department (designed by J. G. Oatley)
	Extension of the medical college (designed by J. G. Oatley)
1915–18	Edith Cavell Home
	Extension to the Alexandra Home (designed by J. G. Oatley)

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12. A sister's bedroom in the early twentieth century: 'Today each probationer, as well as staff nurse, has her own cosy little room, which she can make as pretty and home-like as she pleases, so long as she keeps it in good order'.[112] (Courtesy of Barts Health Archives and Museums, RLHLH/X/155/3)
13. A nurses' sitting room at the London Hospital, furnished with armchairs, bookcases, pictures, and aspidistras. (From an early twentieth-century postcard)

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[1] British Library, Digital Store 1560/2985, *An Account of the Rise, Progress and State of the London Infirmary* (London: 1742), 6.
[2] Royal London Hospital Archives, Barts Health Archives and Museums (RLHA), House Committee Minutes, RLHLH/A/5/4, 289.
[3] RLHA, RLHLH/A/26/32, *Programme for the Ceremony of Opening the Grocers' Company's Wing of the London Hospital* (7 March 1876); RLHLH/A/5/37, 11, 32, 79–80, 84–5: *St James's Gazette*, 18 September 1894; 23 August 1889: *Morning Post*, 30 July 1906.
[4] Census.
[5] RLHA, RLHLH/A/25/1, House Committee Chairman's Papers.
[6] H. Richardson (ed.), *English Hospitals, 1660–1948: A Survey of their Architecture and Design* (Swindon: Royal Commission on the Historical Monuments of England, 1998), 3, 9, 11, 139: J. L. Heilbron (ed.), *The Oxford Companion to the History of Modern Science* (Oxford: Oxford University Press, 2003).
[7] Richardson, *English Hospitals*, 4.
[8] Richardson, *English Hospitals*, 10.
[9] H. C. Burdett, *Hospitals and Asylums of the World: their origin, history, construction, administration, management, and legislation; with plans of the chief medical institutions accurately drawn to a uniform scale, in addition to those of all the hospitals of London in the jubilee year of Queen Victoria's reign*, four volumes (London: J. & A. Churchill, 1891–1893). In Richardson's study of British hospitals, it was noted that literature on hospitals and their planning, such as Burdett's study, provided an 'impetus for change'; Richardson, *English Hospitals*, 5.
[10] Richardson, *English Hospitals*, 9–11: J. Taylor, *Hospital and Asylum Architecture in England, 1840–1914* (London: Mansell, 1991), 11–14.
[11] Taylor's chapter on 'Upgrading the Older Hospital: Ingenuity and Transformation' examines a wide range of modernization schemes; J. Taylor, *The Architect and the Pavilion Hospital: Dialogue and Design Creativity in England, 1850–1914* (London and New York: Leicester University Press, 1997), 105–33.
[12] Taylor, *The Architect and the Pavilion Hospital*, 126.
[13] Ibid., 105–6.
[14] Ibid.
[15] RLHA, RLHLH/A/5/29, 478–9.
[16] RLHA, RLHLH/A/5/36, 236, 331–2.
[17] A. Reed and C. Reed (eds.), *Memoirs of the Life and Philanthropic Labours of Andrew Reed* (London: Strahan & Co., third edn. 1866), 308: *Shoreditch Observer*, 23 March 1867: *East London Observer*, 25 April 1867.
[18] N. J. Cottingham was declared bankrupt in May 1854. In the following September, he was lost in the wreck of the *SS Arctic* on its voyage from Liverpool to New York. *London Evening Standard*, 9 May 1854: *Lloyd's Weekly Newspaper*, 29 October 1854: *Evening Mail*, 13 November 1854.
[19] *London Evening Standard*, 3 April 1865: *The Building News*, 6 June 1890.

[20] J. Ogden, rev. by M. Thomson, 'Down, John Langdon Haydon Langdon-', *Oxford Dictionary of National Biography* (*ODNB*). DOI: https://doi.org/10.1093/ref:odnb/37650: *Surrey Comet*, 24 January 1885.
[21] Work undertaken by Plumbe's practice included warehouses in Queenhithe for James Spicer and Sons, Greenwood's clock factory in Clerkenwell, Unwin's printing works in Blackfriars, and the Valley of Rocks Hotel in Lynton, North Devon. Plumbe oversaw designs for Noel Park in Wood Green and Queen's Park village for the Artisans, Labourers and General Dwellings Company. Other prominent works included the headquarters of the Young Men's Christian Association in Tottenham Court Road, the Temperance Building Society in Ludgate Hill, the Royal National Orthopaedic Hospital in Great Portland Street, and Napsbury Asylum. *The Building News*, 6 June 1890, 793: Royal Institute of British Architects (RIBA), Biographical file.
[22] Painter-Stainers' Company, *List of Past Masters and Wardens* <https://d2d3x0yswqvhr3.cloudfront.net/documents/139-1676-past-masters-portrait.pdf> [accessed 27 September 2018].
[23] *Builders' Journal*, 20 May 1896, 230.
[24] RLHA, RLHLH/S/5/12, Letters from Rowland Plumbe (January 1903 to July 1904).
[25] RLHA, RLHLH/A/24/7–9, House Governors' Office file: Rowland Plumbe.
[26] RIBA, Biographical file: *London Daily News*, 2 July 1862: *Building News*, 6 June 1890, 793: *Builder*, 1919, 381: *Journal of the Royal Institute of British Architects*, April 1919, 140–1: A. Brodie, A. Felstead, J. Franklin, L. Pinfield and J. Oldfield (compilers), *Directory of British Architects, 1834–1914, Volume 2: L–Z* (London and New York: Continuum, 2001), 383.
[27] A bronzed terracotta bust of Plumbe by Sir George Frampton was donated to the hospital after his death by Nora Beatrice Dicksee, one of Plumbe's daughters. The bust was placed in the surveyors' office of the works department. RLHA, RLHLH/A/5/55, 158, 225, 244.
[28] Brodie et al., *Directory of British Architects*, *Volume 2*, 280: London Metropolitan Archives (LMA), P83/MRY1/1256.
[29] RLHA, RLHLH/A/5/56, 72.
[30] *London Hospital Gazette* (*LHG*), RLHMC/A/25/19, Vol. 16, 185–6. On the retirement of J. G. Oatley as hospital surveyor in 1933, his son Norman Oatley took the reins. Plumbe lived at 13 Fitzroy Square from 1868 to 1909; J. R. Howard Roberts and W. H. Godfrey (eds.), *Survey of London: Volume 21, the Parish of St Pancras Part 3: Tottenham Court Road and Neighbourhood* (London: London County Council, 1949), 60.
[31] C. Hickman, *Therapeutic Landscapes: A History of English Hospital Gardens since 1800* (Manchester and New York: Manchester University Press, 2013), 125–6: RHLA, RLHPP/LUC/1, Papers of Eva C. E. Lückes.
[32] L. C. Parkes, *Hygiene and Public Health* (London: H. K. Lewis, first edn. 1889): Parkes, *Hygiene and Public Health* (Philadelphia: P. Blakiston, Son & Co., second edn. 1890): *Science*, 1 November 1889, 301.
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[34] *Builder*, 4 July 1891, 18: *Lancet*, 29 March 1890, 714; 4 July 1891, 36–7.
[35] *Builder*, 4 July 1891, 18: *Lancet*, 4 July 1891, 36–7; 29 March 1890, 714: *Hospital*, 18 November 1893, 110–12: *British Medical Journal* (*BMJ*), 4 February 1882, 152: RLHA, RLHLH/X/3.
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[37] Tobin's tubes were a common method of ventilation, described in G. M. Gould's *A New Medical Dictionary* as: 'a method of ventilation of rooms by the introduction of air through tubes placed in the walls'. Gould, *A New Medical Dictionary: including all the words and phrases used in medicine, with their proper pronunciation and definitions* (Philadelphia: P. Blakiston, Son & Co., 1890), 440. Tobin's tubes had been fitted in the Grocers' Company Wing. *BMJ*, 22 July 1876, 122–3.
[38] *Hospital*, 18 November 1893, 110–2: RLHA, RLHMC/A/25/2, *LHG*, Vol. 4, No. 22, January 1898, 125; No. 23, February 1898, 147.
[39] RLHA, RLHLH/A/5/45, 216.
[40] Personnel included Bertrand Drummond, Harry Edward East, Francis Roland Foster, Ernest Henry Major, Harry Reginald Poulter, Herbert Sydney Rhodes, and Gilbert Mackenzie Trench.
[41] J. Gore, revised by P. Willis, 'Holland, Sydney George, second Viscount Knutsford (1855–1931), *ODNB*. DOI: https://doi.org/10.1093/ref:odnb/33943.

[42] RLHA, RLHLH/A/5/49, 531.
[43] RLHA, RLHLH/A/24/9, Building account on 6 June 1906.
[44] Taylor, *Hospital and Asylum Architecture in England*, 20: P. Temple and C. Thom (eds), *Survey of London: Volume 52, South-East Marylebone* (New Haven and London: Yale University Press, 2017), 702: Taylor cites the example of phased construction at the Royal Portsmouth, Portsea and Gosport Hospital between 1894 and 1914 in *The Architect and the Pavilion Hospital*, 123–4.
[45] RLHA, RLHLH/A/5/47, 192–4, 337, 402; RLHLH/A/5/48, 31: H. Richardson, 'Humphreys' Hospitals', *Historic Hospitals: An Architectural Gazetteer* <https://historic-hospitals.com/2015/08/30/humphreys-hospitals> [accessed 21 May 2018]: *Tower Hamlets Independent and East End Local Advertiser*, 4 June 1898: *Illustrated London News* (*ILN*), 24 August 1901, 286.
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[47] North-facing operating theatres were customary in hospitals; please refer to Richardson, *English Hospitals*, 10.
[48] RLHA, RLHMC/A/25/2, *LHG*, Vol. 6, No. 36, May 1899, 1–3; RLHMC/1/25/3, *LHG*, Vol. 8, No. 65, May 1902, 201.
[49] RLHA, RLHINV/440: *Bolton Evening News*, 19 December 1908.
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[51] RLHA, RLHLH/A/5/48, 162, 270–1, 314, 367, 386; RLHLH/A/5/49, 42–3: *BMJ*, 24 May 1902, 1305–6.
[52] RLHA, RLHLH/A/5/27, 62–3, 144, 154; RLHLH/A/5/48, 122, 173, 241, 314, 420; RLHLH/A/5/49, 42–3, 48: *Pall Mall Gazette*, 15 November 1904.
[53] RLHA, RLHLH/A/5/48, 205, 209–10, 241; RLHLH/A/5/49, 42–3, 364–70; RLHLH/A/24/6–9: W. D. Rubinstein, M. Jolles and H. L. Rubinstein (eds.), *The Palgrave Dictionary of Anglo-Jewish History* (Basingstoke: Palgrave Macmillan, 2011), 823.
[54] RLHA, RLHLH/A/24/6–9; RLHLH/A/5/49, 531.
[55] *BMJ*, 28 July 1900, 269.
[56] RLHA, RLHMC/A/25/2, *LHG*, Vol. 4, No. 16, May 1897, 2.
[57] D. Neumann, '"The Century's Triumph in Lighting": The Luxfer Prism Companies and their Contribution to Early Modern Architecture', *Journal of the Society of Architectural Historians*, Vol. 54, No. 1 (Berkeley, California: University of California Press, March 1995), 24–53: American Luxfer Prism Company, *Luxfer Prisms: Description with Illustrations* (Chicago: American Luxfer Prism Company, 1897), 4, cited by Neumann, 25.
[58] Richardson, *English Hospitals*, 36.
[59] RLHA, RLHMC/A/25/2, *LHG*, Vol. 6, No. 36, May 1899, 2.
[60] RLHA, RLHMC/A/25/2, *LHG*, Vol. 5, No. 27, July 1898, 36–7; Vol. 6, No. 36, May 1899, 8; RLHMC/A/25/3, Vol. 8, No. 58, October 1901, 41–2; RLHMC/A/25/2, *LHG*, Vol. 4, No. 16, May 1897, 2; No 17, June 1897, 21.
[61] Lückes, *Hospital Sisters and their Duties* (Philadelphia: Blakiston, Son & Co., 1886), 45.
[62] Burdett, *Hospitals and Asylums of the World*, Vol. 4, 65, 77.
[63] Burdett, Vol. 4, xvii–xviii: Survey of London, *Volume 52, South-East Marylebone*, 701–2.
[64] RLHA, RLHLH/A/5/11, 285, 323; RLHLH/A/5/15, 52.
[65] *Spectator*, 1 September 1922, 20: A. E. Clark-Kennedy, *The London: A Study in the Voluntary Hospital System, Volume Two: The Second Hundred Years, 1840–1948* (London: Pitman, 1963), 136–7.
[66] In Burdett's study, St Thomas's Hospital and Westminster Hospital are also listed as having isolation wards for infectious patients; Burdett, *Hospitals and Asylums of the World*, Vol. 4, 132–3, 192–3.
[67] Richardson's study includes model plans of isolation hospital ward blocks published by the Local Government Board between 1876 and 1924; Richardson, *English Hospitals*, 140–1.
[68] RLHA, RLHLH/A/5/35, 86; RLHLH/A/5/44, 457; RLHLH/A/5/45, 488; RLHLH/A/5/47, 8 August 1898, 207; RLHLH/A/5/48, 191–3, 215–6; RLHLH/A/5/50; 255, 455: LCC Minutes, 18 June 1907, 1269: E. W. Morris, *A History of the London Hospital* (London: Edward Arnold, 1910), 23.
[69] *Builder*, 13 June 1903, 617: *ILN*, 20 June 1903, 962.
[70] RLHA, RLHLH/A/5/48, 50.
[71] Taylor outlined the sequence for outpatients' departments and dispensaries, and referred to the arrangement at the London Hospital, in *Hospital and Asylum Architecture in England*, 130–3.
[72] In 1895, Wilhelm Konrad Röntgen discovered X-rays, a type of radiation adopted widely for diagnosis and treatment. The pioneering Finsen Lamp, named in recognition of its Danish inventor

and Nobel laureate Niels Ryberg Finsen, emitted light radiation to treat lupus vulgaris, a tuberculous skin infection once common in east London. The hospital's first lamp was donated by Queen Alexandra in 1900 and initially installed in a single-storey shed located in the hospital garden. By 1909 the light department was considered by the *British Medical Journal* to be the finest of its kind in the capital, with treatment machines for up to twelve patients powered by roof-top generators; *BMJ*, 4 December 1909, 1622–3: Richardson, *English Hospitals*, 11.

[73] *ILN*, 24 August 1901, 286: *BMJ*, 4 December 1909, 1622–3: *Lancet*, 20 June 1903, 1759–1: *Builder*, 13 June 1903, 617: RLHA, RLHLH/A/5/47, 32; RLHLH/A/5/48, 83, 209–10, 522, 527, 532–5; RLHLH/A/4/24/7.

[74] RLHA, RLHMC/A/25/2, *LHG*, Vol. 4, No. 23, February 1898, 142–3.

[75] Burdett, *Hospitals and Asylums of the World*, Vol. 4, 77–8.

[76] Plans for the layout of machines in the laundry list hydro-extractors, washing machines, ironing machines, wash troughs, wringers, rinsing and blueing troughs, rinsing tanks, starchers, box mangles, boilers, soap and soda boilers, and steeping tanks; RLHA, RLHTH/S/10/20.

[77] Morris, *London Hospital*, 23, 243–7, 301: RLHA, RLHLH/A/25/1; RLHLH/A/24/7–9; RLHTH/S/10/20; RLHLH/P/7/3/19; RLHLH/S/2/29; RLHLH/S/2/30; RLHLH/S/2/98; RLHLH/S/2/99.

[78] J. Hamlett, '"Nicely Feminine, Yet Learned": Student Rooms at Royal Holloway and the Oxford and Cambridge Colleges in Late Nineteenth-Century Britain', *Women's History Review*, 15:1 (2006), 137–161, DOI: 10.1080/09612020500440952: J. Hamlett, *At Home in the Institution: Material Life in Asylums, Lodging Houses and Schools in Victorian and Edwardian England* (Basingstoke: Palgrave Macmillan, 2015): J. Hamlett, L. Hoskins and R. Preston (eds), *Residential Institutions in Britain, 1725–1970: Inmates and Environments* (London: Pickering & Chatto, 2013).

[79] Hamlett, *At Home in the Institution*, 163.

[80] Hamlett, *At Home in the Institution*, 168. Hamlett also emphasised that both men and women at residential colleges enjoyed decorating and arranging their private rooms. Hamlett, 'Nicely Feminine, Yet Learned', 157–8.

[81] Communal spaces such as living and dining rooms were also provided in women's lodging houses of the period, examined by E. Gee in '"Where Shall She Live?"; Housing the New Working Woman in Late Victorian and Edwardian London', *Living, Leisure and Law: Eight Building Types in England, 1800–1941*, ed. G. Brandwood (Reading: Spire Books in association with the Victorian Society, 2010), 93, 98–99, 108.

[82] Hamlett, *At Home in the Institution*, 162.

[83] Hamlett has noted that discipline in institutions often corresponded with patriarchal hierarchy, with supervision by 'father and mother figures'. Hamlett, *At Home in the Institution*, 5–6.

[84] J. Evans, 'Lückes, Eva Charlotte Ellis (1854–1919), nurse', *ODNB*. DOI: https://doi.org/10.1093/ref:odnb/49192.

[85] Census.

[86] Richardson, *English Hospitals*, 34.

[87] Evans, 'Lückes'.

[88] Evans, 'Lückes': E. C. E. Lückes, *Lectures on General Nursing delivered to the Probationers of the London Hospital Training School for Nurses* (London: Kegan Paul, Trench & Co., 1884): Lückes, *Hospital Sisters and their Duties*.

[89] Census.

[90] RLHA, RLHPP/LUC/1/11, Letter from F. Nightingale to E. C. E. Lückes, 7 June 1892. In this letter, Nightingale referred specifically to accommodation for private and district nurses.

[91] RLHA, RLHLH/A/5/37, 11.

[92] Lückes, *Hospital Sisters*, 111.

[93] Lückes, *Hospital Sisters*, 103, 111.

[94] Evans, 'Lückes'.

[95] RLHA, RLHLH/A/5/46, 344–5, 385.

[96] Lückes, cited by Clark-Kennedy, *The London*, 99.

[97] RLHA, RLHLH/A/5/45, 150–1, 377–8, 384; RLHLH/A/5/49, 335.

[98] Taylor, *The Architect and the Pavilion Hospital*, 131–2.

[99] *ILN*, 28 May 1887: RLHA, RLHLH/A/5/41, 477; RLHLH/A/5/42, 318–9; RLHLH/A/5/43, 188; RLHLH/S/2/102.

[100] RLHA, Plans for the Alexandra Home, RLHLH/S/2/72; RLHLH/S/2/39; RLHLH/S/2/73; RLHLH/S/2/24; RLHLH/S/2/25; RLHTH/S/10/6; RLHLH/P/2/4.
[101] RLHA, RLHMC/A/25/4, *LHG*, Vol. 12, No. 99, November 1905, 88; RLHLH/TH/S/10/23; RLHINV/752: LCC Minutes, 23 June 1903, 974: Morris, *London Hospital*, 314.
[102] Cavell trained as a probationer at the hospital from 1896 to 1898, and worked on its private nursing staff until 1901: Historic England, List Description <https://historicengland.org.uk/listing/the-list/list-entry/1113060> [accessed 6 June 2018]: Taylor, *The Architect and the Pavilion Hospital*, 88–9, 131: RLHA, RLHLH/A/5/55, 384–5, 393, 508, 511, 519; RLHLH/TH/S/10/9; RLHPP/KNU/2/8/18: C. Daunton, 'Cavell, Edith Louisa (1865–1915)', *ODNB*. DOI: https://doi.org/10.1093/ref:odnb/32330.
[103] Lückes, *Hospital Sisters*, 197–8, 76.
[104] Burdett, *Hospitals and Asylums of the World*, Vol. 4, xi: also cited by Hickman, *Therapeutic Landscapes*, 145.
[105] RLHA, RLHMC/A/25/2, *LHG*, Vol. 6, No. 37, June 1899, 23–5: *Globe*, 3 July 1882: *Graphic*, 19 July 1884.
[106] S. Williams, 'Eden, as we know it, is a fertile and happy region situated in the heart of Whitechapel': The nurses' 'Garden of Eden' at the London Hospital', *London Gardener*, Vol. 18 (2013–14), 99–118.
[107] Taylor, *The Architect and the Pavilion Hospital*, 114.
[108] Ibid., 111.
[109] Ibid., 12, 62, 106.
[110] Taylor has noted that reworking at Southampton (1894) and Northampton (1907) was quoted at £200 per bed and £208 per bed respectively. A scheme for rebuilding Manchester Royal Infirmary in 1902 was quoted at £443 per bed. Estimates for the Newcastle Royal Victoria Infirmary ranged from £374 per bed to £536 per bed. Taylor, *The Architect and the Pavilion Hospital*, 124–5.
[111] Richardson, *English Hospitals*, 11.
[112] RLHA, RLHMC/A/25/2, *LHG*, Vol. 4, No. 23, February 1898, 153.