

HISTORICAL ARTICLE

Dr John Rankin; His Life, Legacy and the 50th Anniversary of the Rankin Stroke Scale.

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Abstract

Dr John Rankin (1923-1981) is one of the many distinguished alumni of the former University Department of Materia Medica and Therapeutics, Stobhill Hospital Glasgow. While his varied international career encompassed pulmonary physiology, occupational medicine and public health, he remains best remembered in the United Kingdom for his early stroke publications. In a series of articles published 50 years ago in the *Scottish Medical Journal* he described early rehabilitative stroke medicine using a novel grading system. Half a century on Rankin's eponymous stroke scale has become the endpoint of choice in acute stroke trials. This paper describes Rankin's remarkable career and the legacy of his work, with a particular focus on his stroke research and grading system.

Rankin and the University of Glasgow

John Rankin was born in Glasgow in 1923 into an academic family, his father being a noted Professor of Physics. Rankin began his own academic studies at the Medical Faculty of the University where he achieved several prizes and excelled in pathology. Successfully completing his medical degree, he was awarded the prestigious Rockefeller scholarship to pursue post-graduate study at University of Wisconsin, Madison. He achieved his MD in 1947. During his year in Madison Rankin forged strong transatlantic research links, which remained prominent throughout the rest of his career. Rankin was always thankful for the opportunities afforded by his scholarship and it is fitting that University of Wisconsin now offers the "John Rankin Travel Award" to facilitate international medical research.

Rankin left Madison in 1948, completing training in London before returning to his native Glasgow to work within the University Department of Materia Medica and Therapeutics, Stobhill Hospital. Stobhill was unusual for its time, having an established academic department within a municipal hospital that predominantly cared for older and chronically unwell patients.¹ Working in this environment of scholarly research and real-life clinical medicine clearly influenced the young Rankin. When he eventually led his own department of medicine, he vociferously opposed the traditional culture of elitism that separated academia from routine patient care.

Stobhill was a general hospital providing a range of medical and surgical services. Originally designed to house the large number of patients with encephalitis lethargica following the first world war, a number of beds remained specifically set aside for "chronic sick" patients.² During Rankin's time at Stobhill these



John Rankin circa 1961

beds mostly comprised patients with rheumatic heart disease or stroke. The combination of an active academic department, a young physician with innovative research ideas and a cohort of long term stroke inpatients was potent. Despite serving only three years on the staff at Stobhill, Rankin collected unique and unparalleled observational data on cerebrovascular diseases.

In a period where active intervention for stroke was uncommon and where therapies that were employed (such as barbiturate coma) often contributed to mortality, Rankin's optimistic attitude to stroke was highly unusual. He argued that positive results could be achieved through rehabilitation, time and encouragement, and that there was no place for the therapeutic nihilism exhibited by his peers. Rankin's belief in early mobilisation was strongly influenced by primate work simultaneously being carried out at University of Wisconsin by Travis and Woolsey. Together the three researchers developed theories of the brain's ability to regain function following insult - effectively an early model of neural plasticity.³

Within the chronic sick beds of Stobhill, Rankin effectively created a prototypic stroke unit. It is certainly true that Rankin's ideals of multidisciplinary working and early rehabilitation remain core principles of contemporary stroke care. We can only assume that other faculty staff shared Rankin's views on the value of rehabilitative services. Of the eight doctors who comprised the Department of Materia Medica in the late 1940s, three went on to achieve chairs in the nascent speciality of geriatric medicine.²

Rankin's early stroke manuscripts gave an indication of the themes that would come to characterise his future career: a belief in providing a scientific evidence base to clinical work; recognition of the social aspects of disease and the need for preventative rather than curative medicine. Although remembered for his scholarly achievement at Stobhill, Rankin remained a practical physician, popular with his patients and respected by his junior staff. It is telling that Rankin's final manuscript on stroke described a bespoke apparatus for prevention of drop foot in the paralysed limb.⁴ However, in some less enlightened passages he did comment that only poor outcomes could be expected in "artisans" or "women at an age when the call of the family or the home no longer exist."

Rankin in Madison

It has been commented in neurology texts, that following his time at Stobhill, Rankin's subsequent career passed unnoticed.⁵ It is true that Rankin did not progress his original cerebrovascular work, rather he took an unconventional career "side-step" - returning to University of Wisconsin in 1953 as an undergraduate physiology instructor and eventually pursuing post-doctoral research in pulmonary alveolar diffusion. The University of Wisconsin was founded on principles of equality of access and multidisciplinary delivery of education, and as such it seems appropriate that the idealistic Rankin remained in Madison for the remainder of his life.

The reasons for Rankin's return to Madison and the basic sciences are not clear. It has been suggested that frustration at treating what he saw as a preventable disease, encouraged Rankin to forsake Stobhill and stroke medicine. Primary prevention of morbidity was the driving force for the rest of his distinguished career. Combining his knowledge of pulmonary physiology, clinical medicine and his passion for public health he conducted large scale, long-term field research. Along with researcher Helen Dickey he was instrumental in defining the pathogenesis of the farmer's lung type of hypersensitivity pneumonitis.⁶ In later work he described other industrial lung diseases and alerted the public to the possible environmental and health effects of the industrial rubber industry.

During his twenty three years at the University of Wisconsin medical school Rankin rose through the ranks to achieve chairs in Medicine in 1964; Preventative Medicine in 1968 and he became chief of Pulmonary Medicine (1970). In recognition of the part that the state played in the health of the nation, Rankin served on an increasing number of governmental organisations - over 112 in his lifetime. In spite of the considerable time he gave to administrative and state matters Rankin remained a prolific researcher and devoted teacher. He published over seventy scientific papers, eleven book chapters and forty abstracts, many posthumously. The most tangible aspect of Rankin's legacy at the University of Wisconsin is the small-scale physiology laboratory he developed into a world class research centre - now the John Rankin Pulmonary Medicine Laboratory. One can only guess as to what he may have achieved had he stayed in Glasgow and pursued the study of stroke.



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Rankin died in his home aged 57, having taken his own life. It was speculated in the press at the time that increasing state driven budget cuts to his research programme precipitated this tragic event. If this is the case, it is grimly ironic for a man who gave so much of his time to governmental committees and who passionately believed that medicine and state should work together. Rankin himself had prophetically commented, "whenever you have a conflict between economics and health, health losses out". Tributes were many; from patients, students, professional colleagues and friends. The University of Wisconsin gave a fitting epitaph in his obituary describing him as "the near-ideal model of scholarship, service and humanitarianism."⁷

Rankin, Stroke Medicine and Development of the Stroke Scale

Despite his many laudable achievements it is for his early stroke work that Rankin is best remembered in the UK - in particular his tool for describing post-stroke disability. Rankin shared his experiences of stroke care while in Glasgow in a series of papers submitted to the newly published periodical - The Scottish Medical Journal (which had emerged from the Journal of the Royal Medico-Chirurgical Societies of Glasgow and Edinburgh and the Edinburgh Obstetrical Society). He summarised his research in a seminal manuscript, which was subsequently presented across three papers in the journal: Cerebral vascular accidents in patients over the age of 60. Volume 1: General considerations;⁸ Volume II: Prognosis;³ Volume III Diagnosis and Management.⁹ In these papers he presented critical review of an embryonic stroke medicine literature; described his failed attempts at establishing a west of Glasgow stroke registry and reported his observations of 206 stroke patients admitted through his department and followed to death or discharge. It was in this work that Rankin described his eponymous stroke scale, a tool that was to become instrumental in future stroke studies. Despite Rankin's impressive ground-work, a "Materia Medica" stroke unit with a comprehensive database of cerebrovascular disease was not realised in the Western Infirmary until the early 1990s.

For any physician with an interest in cerebrovascular disease, these papers remain fascinating and prove Rankin's exemplarily knowledge of stroke medicine. It is evidence both of Rankin's forward thinking and of the disappointingly slow progress that has been made in stroke since, that many of the observations made in these original papers remain true today. As an example, although no evidence-based acute stroke therapies were available during Rankin's lifetime, he correctly surmised: "at the onset when treatment is likely to be of most value, accurate diagnosis is often difficult and sometimes impossible." Unfortunately in this age of sophisticated imaging and increasing numbers of proven and potential acute interventions, diagnosis of acute stroke remains a clinical challenge.

Comparison of observations made by Rankin with recent cerebrovascular literature provides further salutary evidence of the prescient nature of Rankin's essays:

John Rankin 1957 "The importance of these lesions (stroke) as causes of disability is widely realised but is hardly reflected in the volume of research devoted to them compared even to a disease as rare as myasthenia gravis."⁸

Rothwell et al 2004 "Stroke and stroke research remains depressingly under-funded."¹⁰

John Rankin 1957 "The number of deaths from vascular lesions of the nervous system in England and Wales increases yearly ... in many instances admission to the appropriate ward is delayed because of shortage of beds."⁸

UK stroke audit 2004 "Despite evidence of efficacy...two thirds of stroke units are having to ration access to this limited resource."¹¹

Rankin described good outcomes in the majority of patients cared for using his unorthodox methods of holistic stroke care. To aid his descriptive work he formulated a novel outcome scale. Rankin's instrument consisted of five hierarchical grades of "functional recovery" from Grade I – no significant disability to Grade V severe disability (Table I). In early stroke work it was not uncommon for authors to describe a bespoke outcome measure. Although some other authors did make use of the Scale,¹² during Rankin's lifetime there was little to distinguish his scale from others cited in the literature. It was not until the development of multi-centre intervention trials that Rankin's scale was "rediscovered".

Table 1 The Rankin Scale

Grade I	No significant disability, able to carry out all usual duties
Grade II	Slight disability, unable to carry out some of previous activities but able to look after own affairs without assistance
Grade III	Moderate disability, requiring some help but able to walk without assistance
Grade IV	Moderately severe disability, unable to walk without assistance and unable to attend to own bodily needs without assistance
Grade V	Severe disability, bedridden, incontinent and requiring constant nursing care and attention

For the first multi-centre trial in neurology - the United Kingdom Transient Ischaemic Attack (UK TIA) study¹³ - trialists needed an easily administered measure of stroke outcomes. Rather than develop an instrument de novo they turned to Rankin's eponymous scale. Following initial pilot work, the UK TIA team revised the wording of Rankin's original gradings to allow for better reliability – the modified Rankin scale (mRs).¹⁴ The mRs was subsequently used in the first International Stroke Trial.¹⁵ The success of these trials alerted the stroke community to the utility of Rankin's scale.

The UK TIA authors attempted to further refine the mRs through the development of the Oxford Handicap Scale (OHS).¹⁶ However, OHS was felt to add little to the mRs, was infrequently used by trialists and was eventually abandoned. In comparison mRs has seen increasing use in the scientific press. A review of the literature in the late 1990s reported mRs as the second most popular disability outcome measure in stroke work.¹⁷ Our own review of recent stroke trials (personal data) suggest that mRs is now the preferred disability outcome measure of UK and international researchers.

mRs is often used as primary end point in clinical trials, as evidenced in pivotal studies of thrombolytic,¹⁸ neuroprotectant¹⁹ and surgical treatment of stroke.²⁰ Rankin's scale continues to grow in popularity. In the last five years it has been used as trial end-point in almost 100 stroke trials,²¹ as such it remains one of the most important manuscripts in the Scottish Medical Journal's 50 year history.

Rankin's scale was developed to aid his descriptive analysis of the natural history of stroke and its putative treatments. The multi-centre clinical trials that characterise contemporary cardiovascular medicine were unknown during Rankin's tenure at Stobhill. It was many years after the Rankin scale had become popular as a stroke research tool that researchers began to analyse its clinimetric properties. Subsequent studies have shown that traditional methods of applying mRs are limited by substantial inter-observer variability.¹⁴ In recognition of this weakness, stroke researchers are now using modern technologies to improve application of the mRs and examples include DVD based training resources and digital recording of mRs interviews for later off-line assessment.²² Given that Rankin's scale was developed during his time in Stobhill hospital it is appropriate that much of this work is being conducted by a team based in the University of Glasgow.

John Rankin excelled as scholar, teacher, administrator and physician. The legacy of his stroke scale continues to influence research and it is likely we will continue to refer to Rankin's early Scottish Medical Journal publications well into the 21st century.

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