Sharing the journey: Sixty years of the Royal North Shore Hospital Spinal Unit

Since the earliest mentions of spinal cord injury in the Edwin Smith Papyrus, authored in 2500 BCE, such afflictions have been considered untreatable and most of medicine since, has regarded patients with spinal cord injury (SCI) as hopeless cases.[1] As recently as the early-20th Century, 80% of patients suffering SCI died within weeks of injury.[2] But in 1936, Donald Munro's establishment of the first spinal injuries unit in Boston represented a marked change in the attitude towards patients with SCI. Munro's initial work in transforming treatment from palliative to rehabilitative care, was revolutionary. Soon after, Sir Ludwig Guttman, a Jewish-German, World War II refugee, was appointed to form a spinal unit at Stoke Mandeville Hospital in England. A few years after its establishment in 1944, Guttman had dramatically altered the outlook for patients with SCI.[3] Although slowly, news of Guttman and Munro's success reached Australia and the first spinal units were established during the 1950s. Sir George Bedbrook founded the first Australian spinal unit in Perth in 1956 but the vastness of Australia's geography precluded care for patients in the rest of the country. In New South Wales, the first spinal unit was established at the Royal North Shore Hospital (RNSH). This essay will describe the creation of the Spinal Unit at RNSH and how its formation changed the nature of care for patients with SCI in Sydney. This story of inspiring success amidst adversity has not previously been reported.

At the time of newly accredited neurosurgeon John Grant's appointment to RNSH in 1952 there were only four senior neurosurgeons in Sydney. Grant was appointed alongside another recent graduate, Geoffrey Vanderfield, and the pair were tasked with establishing a neurosurgical unit, which would be the first in northern Sydney. However, when Vanderfield relocated to the Royal Prince Alfred Hospital soon after, Grant was forced to serve this post alone.[4] To compound difficulties he suffered limited support; on account of his junior status, Grant was encouraged by hospital executives to send many neuropathological cases to other hospitals.[4] Without adequate backing to form the Neurosurgical Unit as he wished, Grant recalled an historical review of medicine in the second World War, which he had read as a registrar. This book featured a section on Sir Ludwig Guttman and, like Bedbrook before him, Grant turned his attention to patients with SCI. Such was the attitude to these patients at the time that executives had no objections to Grant treating these 'hopeless cases' and so, while he garnered experience for complex brain surgery, he began the establishment of the first spinal unit outside of Perth.[4]

Discussions about the establishment of a rehabilitation and convalescence unit at RNSH began in 1955, between WH Lober, a local businessman, and General Medical Superintendent Wallace Freeborn.[5] Lober had been impressed at the treatment that his wife had received at a European rehabilitation facility and wanted to see a similar unit developed in Sydney, donating five-thousand

pounds to the cause. Then a hospital of five-hundred and forty-six beds,[6] Freeborn approved the development of the RNSH Rehabilitation Unit in 1956, and the donation was used to renovate some cottages on the hospital grounds which had been purchased in 1920. The Rehabilitation Unit was opened in 1957.[5]

Given the small nature of the recently established Neurosurgical Unit, John Grant had to find additional space to house SCI patients and looked to include them in this new Rehabilitation Unit. Quickly filled by SCI patients, the hospital funded small renovations and the seventeen-bed unit[4, 7] 'Paraplegic Unit', later known as the Spinal Unit,[6] was officially opened in May 1958.[5] Grant's innovation was quickly well recognised and both he and RNSH became known for their successful treatment of spinal injuries. Such success was due not only to his foresight but also to his determination. Colleagues recall him as a tireless worker, finding him doing his own cerebral angiograms in the early hours of the morning, and his efforts in SCI soon afforded him the respect of executives.[8-11] The success in SCI also raised his reputation in neurosurgery and before long, his Neurosurgical Unit was well renowned and oversaw all patients with neuropathology between North Sydney and Newcastle.[4, 10]

In these years, the Unit yielded the greatest outcomes by addressing the simplest complications.[4, 8, 10] Without attention, common bladder, bowel, skin, and respiratory complications could prove fatal. When these concerns were routinely treated, in part due to the establishment of other hospital units such as the Intensive Care Unit, the mortality rate of patients was significantly improved. Grant's successful establishment was largely dependent on his recruitment of several talented practitioners who were able to form a small multi-disciplinary team. During a visit to Stoke Mandeville in 1957, Grant had recruited Jan Benn, a physiotherapist, who established spinal rehabilitation at RNSH. She was later joined by Jean McPhail. Likewise, occupational therapist Jean McLeod, and social worker Anne Pye were integral to the multi-disciplinary care of early patients.[4, 8, 10] These individuals were not only important team members but helped establish departments for years to come. The Unit was especially indebted to the early nursing staff and the surgical dressers who supported them. Having returned from experience at Stoke Mandeville in May 1958, Sr May Lamberton was the first Sister-in-charge of the Unit until 1961, when she left to become Matron at Bodington Hospital in Wentworth Falls.[8, 12] Having joined earlier that year, Sr Nancy Joyce replaced her.[8, 13] Thanks to this early team and despite its modesty, this early unit was able to achieve substantial outcomes and began to receive international recognition.[14]

Although the Unit had provided greatly improved results to patients with SCI, it suffered from a lack of staff and funds and according to Grant was 'hopelessly inadequate.'[4] Letters in the hospital archives show the struggles that Sr Lamberton experienced in trying to secure just two hospital beds

of good standard in 1958.[15] The wooden workman's cottages had been built in the 1880s[5] and without air-conditioning, they were at the mercy of the weather. Because hot Sydney summers left thermoregulatory-compromised patients at risk of hyperthermia, they would be hosed down with cool water on the lawns.[8, 10] Doctors would need an umbrella during ward rounds on rainy days due to the leaky roof and possums were regular visitors to patients' beds.[10] 'Cottage Four' was reserved for physiotherapy, however the facilities were insufficient. Worst of all, the small unit was always at capacity. The average stay was over twelve months[14] and with a limited number of beds, other hospitals needed to nurse patients for extended periods before vacancies at the Unit opened.[14] This delay exposed patients to non-specialised nursing in convalescence wards and resulted in patients being admitted to the Unit with complications like bed sores and bladder infections. In turn, these complications cyclically increased patients' time spent in the Unit, further extending waiting times for others, in turn creating more complications.[8, 10]

Having first visited the Unit in 1957, Sir Ludwig Guttman returned in 1962 and was commissioned by the Australian Medical and Paraplegic Associations to report on the facilities for paralysed patients in Sydney. His assessment was scathing; 'Nothing could have revealed more dramatically the extraordinarily low standard of management of a paraplegic.' Of RNSH specifically, he wrote, 'I found the facilities for physiotherapy quite inadequate … little progress has been made … during the last five and a half years.'[16] So, while the Unit had greatly improved the profile of patients with SCI, its outcomes were limited by its lack of funding. Though Grant's innovation and surgical prowess had been significant, the long-term success of the Unit implored full-time direction to oversee the entirety of patient care and provide political advocation.

In December 1964, John Yeo, who had training in orthopaedics and neurosurgery, left general practice to accept a full-time position at the Spinal Unit with a view become Director after a few years of SCI training.[10] However, the state-of-affairs in the Unit sowed doubt about his future. Often, patient notes had not been written in for months and although the Unit had given them a 'lease of life', these patients largely had 'no future and no hope.'[10] Not only were the conditions poor but oversight was lacking. Heavily dependent on a multi-disciplinary team, the Unit required careful coordination. However, John Grant, who was managing most neurosurgical cases in the state by this time, did not have time to offer the Unit the direction it required. Though Yeo had personal aspirations of becoming a surgeon, he realised that his future in the Unit was outside of the operating theatre. He understood that with a multi-faceted approach the Spinal Unit could become successful and patients with spinal paralysis could leave the Unit not to live a short and unfulfilling life but one 'with a future of some promise.'[10] By taking a step back from surgery Yeo was able to concentrate on many aspects of care that were underserved in the Unit at the time, in advocation, prevention, rehabilitation, and support after discharge.

Yeo became the Director of the Spinal Unit in December 1968, during which time he worked tirelessly to allay the complications provided by the lack of staff. He sought to reduce patient time in the Unit, to reduce waiting times and their associated complications and to allow the Unit to treat more people. Given the poor physical therapy facilities, John Grant arranged for patients to relocate to a new rehabilitation facility at Mt. Wilga Hospital in Hornsby after acute treatment.[4, 10] As Grant had done before him, Yeo also undertook overseas study tours to leading spinal units to ensure that the RNSH was providing a high standard of care. Further, as a full-time employee of the hospital unlike Grant, Yeo was able to dedicate time to coordination of new teams within the unit, and to petitions to the executive for improved funding.[10]

Despite the limitations still experienced by the Unit during the 1960s, its success was buoyed by advancements in the international community. As interest for SCI increased within the wider faculty, techniques improved. In 1960, the International Medical Society of Paraplegia was established, and the journal *Paraplegia* began publication in 1963. Coupled with increasing expenditure, the continuing progress in nursing and rehabilitative techniques encouraged the rise in positive patient outcomes. The complications of spinal surgery with involvement of the cord began to be appreciated and anaesthetic medicine continued to improve.[10] The impression of historically poor surgical outcomes had led Guttman to completely disparage all surgical interventions but at RNSH, Grant and Yeo realised that ideal management required a balance of surgical and non-surgical interventions, which resulted in increasingly better results.[4, 10] Additionally, the foundation of other spinal units in major cities assisted the Australian SCI effort. A spinal unit at the Austin Hospital in Heidelberg, Victoria, had been formed around the same time as the unit at RNSH and later, a unit was established at Princess Alexandra in Brisbane.[17] Further, a second spinal injuries unit was founded at Prince Henry Hospital in South Sydney, by George Burnsiton in 1965,[18] which reduced some pressure on RNSH.[10]

Yeo, though primarily frustrated about the lack of funding, was also dissatisfied by the poor understanding of spinal cord damage. Unlike other surgical endeavours, successful operation seemed to often offer no improvement to neurological function for SCI and though some research had been undertaken, the complexities of cord neurology remained poorly understood. In response and amid his continuing appeal for better facilities in the Unit, Yeo established a research team seeking to better understand the mechanisms of spinal cord dissolution during injury. But these tasks were made challenging by a lack of financial support, as hospital executives struggled to see the benefit of investment, both into research and into expensive facilities for SCI patients. Then General Medical Superintendent, Roger Vanderfield was said to complain at staff Christmas parties that that of all the unit directors, Yeo's file of funding requisitions was 'the largest in his possession.'[10]

So, not only was Yeo's task challenging but he had little local support however, he found backing from outside the Unit. Professor Tom Reeve, a general surgeon and expert in thyroid surgery, offered Yeo great support in his studies. Dr Doug Keller, the Unit's urologist, and Professor Doug Tracey, who had established the Unit of Clinical Investigation at RNSH and was later foundation Professor of Surgery at St. Vincent's Hospital, both gave important encouragement. Similarly helpful was support received from George Bedbrook, and Professor Byron Kakulas, each acclaimed for their work at the Spinal Unit in Perth. Dr Richard Jones, who directed the Spinal Unit at the Prince Henry Hospital from 1969,[18] also provided Yeo with support, both in research and in wider attempts to improve the standing of treatment for SCI. Perhaps most importantly, the Unit was joined by Sue Rutkowski as a registrar in 1972 and she quickly became imperative to its coordination. Yeo's wife Joy, a teacher, was also of great inspiration to those in the Unit, taking an active hand in fundraising. Joy also took extra care with young and regional patients, who would often stay with the Yeos after discharge.[10]

As he researched SCI, Yeo's primary focus remained the improvement of the Unit's funding. Grant had made inroads with his relationships with executives and politicians but soon after becoming Director, Yeo recognised he would need to serve as a staunch advocate for the Unit and he placed large focus on public relations, though sometimes at the expense of his own reputation. The hospital executive was often concerned by Yeo's public appeals and his continual, blunt representations to the media about the conditions in the Unit. Yeo's candour with the media, which drew attention to the parlous state of funding, at times even attracted the ire of the Minister for Health.[10] However, such efforts were useful. In 1964, the sentiments of Ludwig Guttman's confidential report were described by the press and concerns were raised by local politicians.[19] John Waddy, then Member for Kirribilli, made a speech in the Legislative Assembly the following year, referring to the conditions in the Unit as 'deplorable' and calling for greater funding.[20]

However, convincing more politicians and hospital executives to offer investment in a Unit with relatively poor, long-term patient outcomes remained difficult. Yeo recalls 'all but laying down in front of the Health Minister's car when they came to visit the Hospital' in these efforts.[10] Joyce and Grant were able to secure Ministerial attendance at major events like annual Christmas Parties, and royal and celebrity visits offered the Unit publicity. Grant, Yeo, and Joyce used these opportunities to advocate for government investment in SCI. Grant had helped found the Paraplegic Association of New South Wales in 1961, later to be renamed the Paraquad Association, which was also a powerful force in advocacy. Conversations about a more modern ward were being had as early as 1961 but it would be many years until work began.[5] Finally, the years of advocation on the part of Yeo, Joyce and Grant were successful and in 1976, the Spinal Unit was relocated to a new hospital building.[8] Part of a $20 million project, this development included an entire floor for neurosurgery and SCI, featuring

fifty beds for spinal injuries, a new gymnasium, and occupational therapy facilities.[4] Helicopter facilities were installed in 1979 as a part of the Emergency Retrieval Service, the first of its kind in Australia.[6]

Though the new ward lost some of the freedom and familiarity that the cottage housing was known for, the dramatically improved facilities and larger dedicated staff allowed for improved patient care for a greater inpatient population. With increased expenditure, the Unit also expanded in the size of staff, now featuring a large multi-disciplinary team, involving physiotherapists, occupational therapists, engineers, social workers and neurologists, all of whom were critical to the Unit's performance.[4, 8, 10] Finally, the Spinal Unit at RNSH was now situated in high standard facilities and the vision towards improving long term quality of life finally seemed acheivable.[10] By the mid-1980s, the prognosis of SCI within the unit was greatly improved; paraplegic patients were expected to live around 85% of their normal life expectancy, 80% for quadriplegic patients.[10, 21] Though Mt. Wilga closed soon after the building of the new RNSH building,[4] the Unit was able to accommodate even more patients by having patients undergo most of their rehabilitation at Moorong Spinal Unit, at the Royal Rehabilitation in Ryde. The Paraquad Association played an important role in assisting patient's lives beyond discharge from acute care and rehabilitation.[4, 10]

Though its progression to this point had been significantly dependant on Grant and Yeo's work, success would not have been possible without integral aid of a great variety of others. Most significantly, the Unit was indebted to its now large, specialised nursing staff. Nancy Joyce assisted John Yeo's directorship in great part, overseeing the entirety of patient care. Though its familiarity was occasionally frowned upon by the Matron,[8] the 'Joyce era' was characterised by her kindness, which made a marked difference to the quality of life of patients in the Unit.[13] Despite her capable leadership however, nursing in the Unit was challenging, as was articulated in a study commissioned by the RNSH in 1984, which concluded that nurses in the Spinal Unit were the subject to the most stress of all departments. 48% of nurses in the Spinal Unit described experiencing 'high stress', 9% higher than the next ranked Maternity Ward.[22] So, not only was the nursing staff critical to the Unit's success, nurses performed such critical work, under notable duress.

However, for those whom it suited, the Unit was enriching. Joyce described that though 'jolly hard work … I enjoyed every second of it.'[8] The Unit also served a significant role as the primary hospital for specialised spinal nursing training. Because the dedicated nature of SCI nursing was so imperative to the outcomes of patients, this education was extremely significant. To further the educative reach, the Unit's senior nurses petitioned the New South Wales College of Nursing to establish a training course in SCI. Rosalie Pratt, who trained at Stoke Mandeville and served as a clinical nurse instructor in the Unit from 1974, was seconded to the College to run this training programme, which began in

1977. Pratt went on to become Pro-Dean of the Faculty of Nursing at the University of Sydney.[23] Joyce also singles out Rosemary Price, who was her second in command and, like Joyce and Pratt, was tireless in her care and compassion for the Unit's patients.[8]

Nurses were not alone in their high work-place stress and life for all those in the Unit was challenging at times. Disappointment about a lack of cure for SCI remained pertinent and the often tragic nature of patient's injuries was confronting. Moreover, the Unit's reliance on the multi-disciplinary team was occasionally complicated. Grant and Yeo were joined in the Spinal Unit in the 1970s, by newly appointed Professor of Orthopaedics and Trauma, Thomas Taylor, who specialised in paediatrics and scoliotic correction.[24] Taylor performed some of the earliest innovative Harrington rod instrumentations for patients with idiopathic scoliosis and was among the first to employ the use of intraoperative spinal cord monitoring in Australia.[9] He also lectured and published extensively in his role as an academic surgeon at the University of Sydney. The orthopaedic expertise that he and his registrars provided to the Unit were of great addition to the growing multi-disciplinary team. However, because the Unit involved senior colleagues from differing specialties, relations between leading doctors was occasionally constrained. Taylor and Grant are remembered as possessing strong convictions and although at times Yeo felt that the surgeons did not have full appreciation for his neurological research, they made a good team.[10] As Taylor and orthopaedic registrars became more involved in the unit, Yeo had more time to spend outside of the ward.

Though outcomes in the Unit continued to improve during the 1980s, prevailing historic pessimism amongst the medical profession continued to hinder patient care. Yeo remembers confrontations with doctors in the Intensive Care Unit who sought to prioritise the treatment of non-SCI patients and having to remove registrar's annotations which read 'do not resuscitate' from spinal patient's notes. These attitudes not only impacted patient care but were detrimental to mental health of those discharged. In England, Guttman had founded the Stoke Mandeville games in 1948[3] and Jan Benn was keen to establish a similar initiative at RNSH. With Grant's help, the first of such were held at Mt. Wilga Rehabilitation Hospital in 1959 and RNSH hosted the first Annual Paraplegic Sports Day the following year.[5, 25] These games attracted attention in the media and were often attended by the Minister for Health. Most importantly, it offered great purpose to patients and provided a platform to demonstrate their capacity to the wider community. Through the Games, the Unit was able to demonstrate that with investment in rehabilitative programmes, patients could return to the workforce and were not the financial burden that they were perceived to be in the wider community.[10] These games ran until 1988, alongside the Paralympics and national competitions.[4]

The Unit also served a principal role in education. As a state-of-the-art centre, the Unit successfully trained nurses, physicians, and surgeons who have since become leaders in their fields. In the 1970s,

Yeo also spent time travelling to country towns to educate regional doctors about rehabilitation, to improve local treatment, and reduce the costs and effort of regional patients having to travel to the city for care. Instigated by Yeo, Rutkowski developed this programme, forming the Rural Spinal Cord Injury Service which continues to hold multidisciplinary clinics in locations around regional New South Wales.

Yeo's research into the damage of the spinal cord during injury continued until the award of a Master of Surgery from the University of Sydney in 1980. Though progress was limited and a total understanding of the mechanisms of SCI dissolution remain unknown, his research encouraged wider interest and investment into the underfunded field of spinal cord neuropathology. With a cure for SCI remaining out of reach, Yeo turned his attention to prevention, petitioning the government to invest in awareness campaigns.[10] Large numbers of discharged patients worked in these campaigns, helping to reach over one million children during school visits to explain the importance of safety in cars and sport.[10] The New South Wales government ran advertisements and educational initiatives seeking to inform the public on seatbelt wearing, the risks of diving into shallow water, and neck exercises for rugby players. The number of lives saved due to these prevention campaigns will never be known but is certainly significant.[26]

Eventually, those who established the RNSH Spinal Unit left their positions to the next generation of practitioners. Nancy Joyce retired in 1983; a new era of 'team-nursing' had been instituted after moving to the new building which left the Unit more capable of function without her guiding hand. John Grant retired as a consultant neurosurgeon in 1987, leaving Bill Sears to succeed him.[4] Tom Taylor did the same in Orthopaedics, retiring from active service in 2001.[24] John Yeo stepped down from a twenty-four-year directorship of the Spinal Unit in 1992 but remained an Honorary Medical Officer and Director of the Rehabilitation Unit at Moorong until his retirement in 1995. He continues to advise government spending on SCI.[10] Sue Rutkowski, replaced him as Director at RNSH. Since leaving the Unit herself, Rutkowski continues coordinate programmes for spinal injuries, including the Rural Spinal Cord Injury Service.[27]

In the years since, the development of other proficient neurosurgical departments and rehabilitation facilities in Sydney has reduced the reliance on RNSH to accommodate nearly all patients with SCI in New South Wales. However, the RNSH Spinal Unit remains a centre of excellence, both for treatment and teaching. Presently, RNSH and the Prince of Wales Hospital in Sydney's Eastern Suburbs remain the only multi-disciplinary teams for the treatment of SCI.[28] The RNSH Spinal Unit continues to accept most of the acute spinal injuries within New South Wales and features specialised teams for spinal plastics, fertility, and sexual function, further improving quality of life for patients with SCI.[28] After initial management and acute rehabilitation, around half of patients continue to undergo

physical therapy at the sub-acute facility at Royal Rehab in Ryde, previously Moorong Spinal Unit.[27, 28] Royal Rehab also coordinates the New South Wales Spinal Outreach Service, which directs imperative support for patients after discharge.[27, 28]

Though Sydney's health services are now better equipped to manage the complexities of SCI than when the RNSH Spinal Unit was established in 1958, for many years after it was founded, the Unit was unique in its treatment of patients. Together with the Spinal Unit at Prince Henry Hospital, the Royal North Shore Spinal Unit pioneered the treatment of spinal disorders in New South Wales. Thanks to the founding work of John Grant and multi-faceted commitment from John Yeo, with imperative support from Sue Rutkowski and nursing staff led by Nancy Joyce, amongst many others, within twenty-five years of establishment, the Unit had developed into an internationally acclaimed centre for SCI treatment. It likewise made significant impacts for prevention, research, and teaching within the field. Through this group of inspired individuals and a family of practitioners, patients, and their relatives, the community at the RNSH Spinal Unit shared a remarkable journey of improvement and ultimate success for the outcomes of patients with spinal cord injury in Australia.

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To best satisfy the requirements of the HM Moran Prize, archival photographs which accompany this essay have been removed. If photographic material is appropriate for submission, the same essay, with photos included may be viewed here:
https://www.dropbox.com/s/m2v7i348z0a4ckd/HM%20Moran%20with%20pictures.pdf?dl=0

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