

Optimising neurosurgical outpatient care: a paradigm shift?

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ABSTRACT

INTRODUCTION: The Wellington Regional Hospital (WRH) neurosurgical service has noted a substantial increase in patient volumes over the last decade, with referrals to the neurosurgical outpatient clinic appearing to have increased even more substantially.

AIM: To quantify the increase in referrals to the WRH neurosurgical outpatient service and to determine whether this has translated into an increase in the number of neurosurgical procedures performed.

METHODS: All referrals to the WRH neurosurgical department from the lower North and upper South Islands of New Zealand spanning 10 years were collected. Key outcome data were the number of interventions performed. In addition to GP referrals, all specialist referrals to the WRH neurosurgical outpatient service were also analysed as a comparison.

RESULTS: In total, 19 201 patients were referred to the WRH neurosurgical service over the 10 years of the study. Within this timeframe, 7105 patients were referred by GPs and 12 096 were referred by specialist teams. Only 348 patients (4.9%) referred by GPs underwent some form of therapeutic intervention, compared to 3489 patients (28.8%) referred by specialist teams.

DISCUSSION: Our data shows that specialist referrals result in a proportionally greater number of therapeutic interventions than GP referrals. This is in part due to the wider array of diagnostic tests available to specialists compared to GPs. The development of relevant guidelines for primary care referral to a neurosurgical service appears warranted and could facilitate initiation of appropriate investigations in primary care.

KEYWORDS: Neurosurgery; outpatients; primary health care; referrals

Introduction

In many health care systems, the general practitioner (GP) plays a pivotal role as 'gatekeeper', controlling patient access to secondary and tertiary care, based on the principle of need.^{1,2}

In the United Kingdom (UK), some guidance for the referral of common conditions to surgical specialists has been provided to GPs with the aim of improving the equity of access whilst still maintaining their gatekeeper role.³ Such guidance, however, has not always been rigorously adhered to. In the current New Zealand (NZ) environment, GPs have no formal guidelines when referring for a neurosurgical opinion. Generally, GPs

have only a limited range of diagnostic imaging available (plain film X-rays). They do, however, have the means to refer patients to the allied health workforce (e.g. physiotherapy) directly.

Although the number of neurosurgeons in NZ has remained relatively static over the last decade, a substantial increase in the operative neurosurgical caseload has been demonstrated.⁴ As a consequence, neurosurgeons are spending an ever greater proportion of time screening patients, rather than operating on them.

Our centre, a tertiary referral hospital based in Wellington, serves a population of approximately 910 000 people living in the lower North and

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upper South Islands of NZ.⁵ The service is presently staffed by four full-time neurosurgeons and three full-time neurosurgical registrars. Patients are referred by GPs or hospital specialists either directly to our emergency service, or to our outpatient clinics. All referrals are triaged by a consultant neurosurgeon. We currently conduct satellite clinics at three other provincial hospitals in the North Island. As recently as 2011, we were active in five peripheral centres, but the reduced availability of air transport has necessitated a consolidation of this service. For logistical reasons, patients from the upper South Island are seen in Wellington. The catchment areas include Wanganui, Palmerston North, Hawkes Bay, Taranaki, Hutt Valley, the Wairarapa and down to Wellington. The South Island catchment areas include Nelson and Blenheim. Each outpatient clinic is generally conducted by one consultant neurosurgeon and one neurosurgical registrar (resident). The vast majority of new patients are initially assessed by a consultant neurosurgeon.

The aim of this study was to determine whether there has been an escalation in GP referrals to the Wellington Regional Hospital (WRH) neurosurgical outpatient service and whether this has translated into an increase in the number of neurosurgical procedures being performed. A secondary aim was to determine whether there was any difference in the outcome of a GP referral when compared to a specialist referral. It is important to note that due to orthopaedic staffing shortages at the time of the study, 70% of current non-traumatic spinal-related cases are referred to our neurosurgical service. This is the opposite of what appears to occur in other parts of NZ.

Methods

All primary care referrals to the WRH neurosurgical department from the lower North Island and upper South Island of NZ, spanning the 10 years between July 2003 and July 2013, were collected. This data was accumulated by contacting the various centres that form part of our catchment area, and documenting all referrals to the neurosurgical team. The emergency department database, EDIS, was also tapped as a source of referral data. Only patients actually seen by a member of the WRH neurosurgical team, either in the

WHAT GAP THIS FILLS

What we already know: In the current New Zealand environment, GPs have no formal guidelines for referring for a neurosurgical opinion. There is generally only a limited range of diagnostic imaging available in primary care.

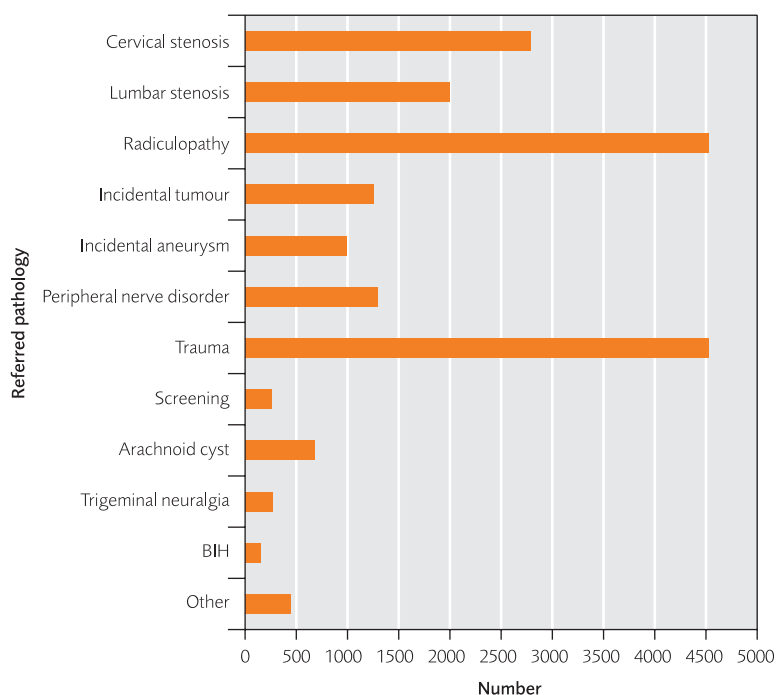
What this study adds: This study quantifies the number of referrals by GPs to the Wellington Regional Hospital neurosurgical service and the number of interventions resulting from these referrals. It provides data to support the development of guidelines for referral which empower general practitioners to commence appropriate investigations in primary care.

outpatient department or emergency department, were recorded on a spreadsheet. These data were cross-checked with the operating theatre software, ORSOS, and the allied health care referrals database to document the number of patients who had a neurosurgical operation or allied health intervention performed over the same period. These data were also cross-referenced with our clinical measurement unit (CMU) and our radiology department's medical applications portal to deduce the number of patients who had nerve conduction studies or diagnostic and therapeutic radiology procedures (foraminal/nerve sheath injections, angiography for arteriovenous malformations and aneurysms etc.), respectively. The precise reason for each referral was documented.

We defined a procedure as any form of therapeutic intervention. This included surgery, interventional neuroradiology or treatment by an allied health care practitioner. The 'time waiting to be seen' for each referral was documented, in addition to the quantity and type of diagnostic imaging and neurophysiological studies. Other data collected included patient age, sex, and whether patients were discharged back to the care of their GPs from the WRH neurosurgical service.

Key outcome data sought were the number and type of procedures or interventions performed. These included operations performed by a member of a WRH neurosurgical team, therapeutic procedures performed by the radiology department including foraminal/nerve sheath injections, angiography and endovascular treatments, and patients referred for physiotherapy and occupational therapy.

Figure 1. Referrals to the neurosurgical outpatient service that required therapeutic intervention according to pathology*



BIH Benign intracranial hypertension

Patients referred by GPs to peripheral hospital emergency departments were not included in this study as there was no uniform means of acquiring this data.

All specialist referrals to the WRH neurosurgical outpatient service were also analysed using the same outcome measures. Patients referred by the emergency department were included in the study. Patients referred acutely to our service by specialist teams were excluded from the study, as were patients who did not attend their outpatient appointments.

Statistical analysis was carried out using R-2.9.1. As our hypothesis was that there would be a higher number of GP referrals which were not coupled to an increase in therapeutic interventions, we were restricted in our analysis. W2 tests were used to test tabulated data, perform a power study and plot the data. A smoothed spline curve was not chosen to aid this paper, as it consists of a sequence of cubic polynomial curves

with no discontinuities which results in difficult interpretation.

Results

In total, 19 201 patients were referred to the WRH neurosurgical service over the 10 years of the study (July 2003 up to July 2013). The breakdown of these referrals by condition is provided in Figure 1. Within this timeframe, 7105 patients were referred by GPs and 12 096 were referred by specialist teams in our region. Referrals were received by telephone, facsimile, post, email or through an internet-based electronic delivery system.

The mean age of the patients referred was 41 years, with 48 years being the median. Approximately 45% of the patients were male and 55% were female. The mean time for a patient to be seen in the outpatient department was 1.9 months at our hospital and 2.6 months in one of our peripheral clinics. The commonest reason for referral was previous head trauma resulting in ongoing neurological symptoms and signs. The second most commonly referred problem was axial pain (limb pain secondary to a spinal cause). The majority of patients were referred from peripheral centres (58.9%) and 41.1% were referred from the Wellington region. Overall, there was a 54.4% increase in referrals between July 2003 and July 2013. The increase in GP referrals over this timeframe was 62%. The increase in specialist referrals over the 10-year period was 39%. Only 15% of GP referrals were solely for investigations. In this timeframe, the population of our catchment region only increased by 18%. The figures obtained for the Wellington-based patients comprised both GP and ED referrals for neurosurgical outpatient review.

With regards to investigation, a total of 6307 patients required at least one radiological or neurophysiological study. In total, 2916 patients underwent some form of surgical intervention, 621 required an image-guided foraminal, epidural or nerve sheath injection. One hundred and ninety-eight patients were discharged to the allied health care team for definitive management and 102 patients underwent angiography or endovascular treatment.

Of the patients referred by GPs, only 348 underwent some form of therapeutic intervention (4.9%; Figure 2). This value was significantly lower than those referred by specialist teams ($p=0.0015$). Patients referred by specialists who required intervention totalled 3489 (28.8%). The total number of patients from the group referred who required therapeutic intervention was 3837 (20.0%). The summary of interventions provided by the neurosurgical service is outlined in Figure 3. If physiotherapy and occupational therapy as therapeutic interventions are excluded, then only 4.3% of patients referred by GPs required neurosurgical service intervention.

Of all patients, 39% examined by neurosurgical registrars and 25% seen by consultants were discharged after their first visit. Seventy-eight percent of such patients were discharged as their symptoms had completely resolved and no further neurosurgical investigation was deemed necessary. With regard to stratified discharge rates, 69% of patients referred by GPs versus 40% referred by specialist services were discharged after the first follow-up. This difference was statistically significant ($p=0.011$). Thirty-two percent of GP referrals underwent radiological imaging, but were subsequently discharged. Almost all (99%) patients with a family history of subarachnoid haemorrhage who came forward for screening had no visible aneurysm on CT. The majority of patients who were discharged after their first appointment were head injury referrals (91%) and patients with radicular pain (77%).

Collation of the number of referrals to the neurosurgery outpatient service over a 10-year period from July 2003 to July 2013 suggests that the number of referrals to the service is trending upwards (Figure 4).

Discussion

GPs play a vital role as gatekeepers to secondary and tertiary care. At present, they have little guidance as to what constitutes an appropriate referral to the neurosurgical service. This may reflect a deficiency in the neurosurgical component of the NZ medical school curriculum.⁴ There may be insufficient understanding of

Figure 2. Number of patients referred by general practitioners versus specialists and the number from each referral source who underwent intervention

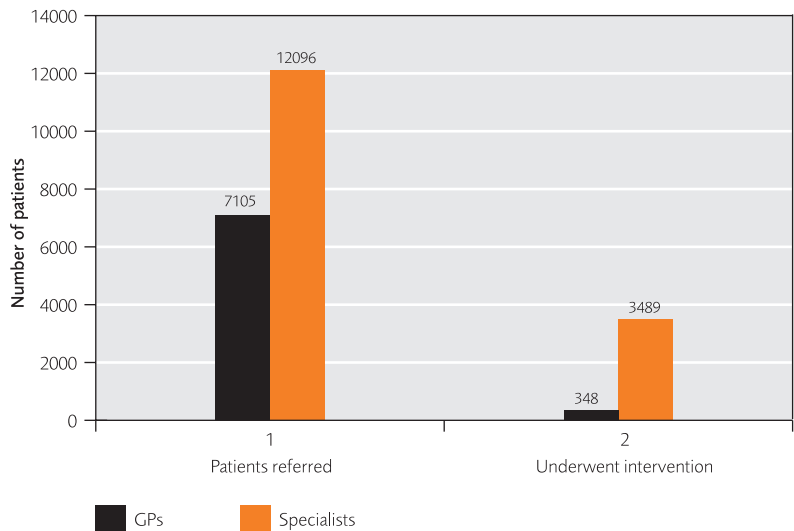
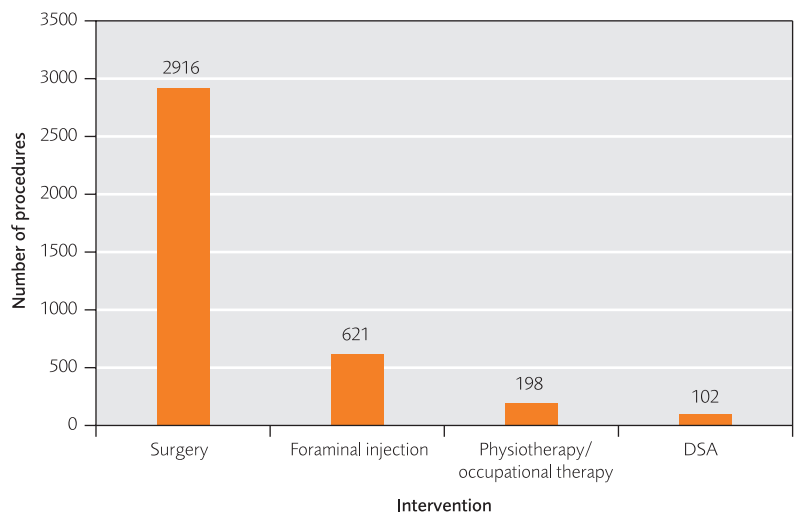


Figure 3. Breakdown of interventions provided



DSA Digital subtraction angiography

neurosurgical conditions underpinning the large number of referrals that could have potentially been avoided. Inappropriate referrals place additional burden on the public health system and prevent more appropriate referrals from being assessed in a timely manner. This can also act to 'de-skill' surgeons who as a result may spend proportionately more time sifting through referrals. It follows that the less surgery done,

the less familiar it becomes and so effectiveness potentially diminishes and complication rates potentially rise. As a model of care, the current GP referral process for a WRH outpatient neurosurgical consultation is not sustainable.

The fact that only 4.9% of patients who were referred to the neurosurgical department by GPs underwent some form of therapeutic intervention is alarming and suggests the inappropriate use of a limited resource. Our data also suggest that the number of referrals over the years is trending upwards.

A document published by the Western Australia Department of Health indicated that outpatient demand increased for surgical clinics in Western Australia by 57.4% from 2007 to 2011. The same paper highlighted outcomes of outpatient appointments at metropolitan tertiary hospitals and demonstrated that only a small percentage of referrals by GPs to outpatient clinics resulted in the placement of patients on the elective surgery waiting list.^{2,6} These findings are very similar to our dataset.

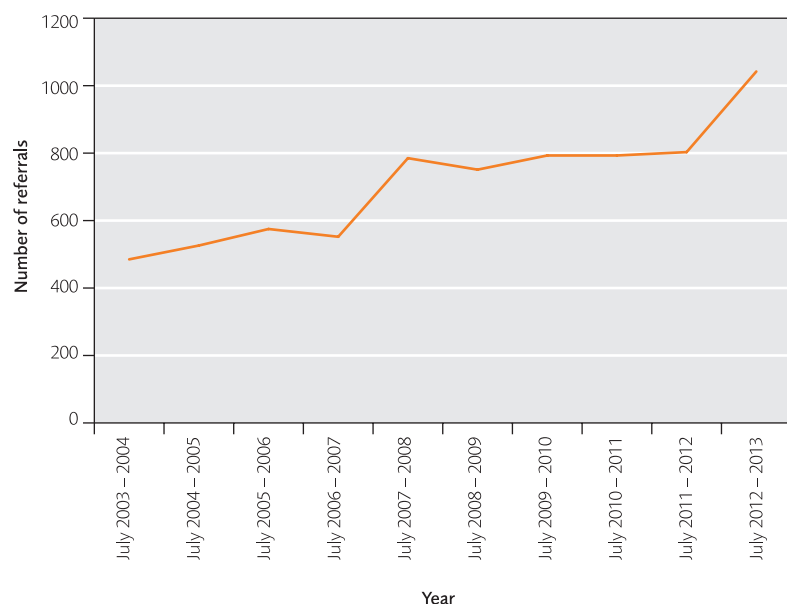
Our data suggest that specialist referral results in a proportionally greater number of therapeutic

interventions. Clearly this is due in part to the wider array of diagnostic tests available to specialists compared to GPs. It also reflects a better understanding of neurosurgical pathologies. There are an increasing number of GP referrals to the neurosurgical service which are not proportional to population increase.

The authors recommend that the development of GP neurosurgical referral guidelines based on specific conditions or potential diagnoses be considered. Descriptive data of the type collected in this study could be a useful basis for the development of a set of referral guidelines. There have been papers stating that guidelines for referral for elective surgical assessment by GPs appear to improve appropriateness of referrals and the quality of pre-referral diagnostic investigation.⁶

The formulation of guidelines for referrals for specific conditions is beyond the scope of this paper and will therefore not be discussed in detail. The importance of guidelines, however, is exemplified by the finding in this study that 91% of referred head trauma patients could be discharged at their first appointment. Similarly, of the 2389 GP-referred patients with radicular symptoms, 77% had experienced resolution by the time they were seen. It is well documented that the vast majority of patients with radicular symptoms may be symptom-free within six weeks of onset,⁷ so referral of this patient group to the outpatient neurosurgical service is clearly an inappropriate use of resources. The authors agree that if patients present with focal neurological deficits, then urgent referral should be arranged. Failing this, two months of observation and symptomatic treatment should substantially reduce the need to refer. Another example would be patient familial screening. The authors agree that where strong family history of certain diseases is prevalent, such as aneurysmal subarachnoid haemorrhage, the unaffected or undiagnosed patient may require formal imaging as a screening measure. However, from the 258 patients referred to our service for screening, 99% of these patients had negative tests for the disease concerned. This would advocate for GPs organising radiographic imaging directly, instead of placing an increased burden on the already overwhelmed neurosurgical outpatient service. One could argue that not

Figure 4. Referrals over the 10-year period from July 2003 to July 2013 demonstrate an increasing trend



all patients in NZ have access to GP-initiated radiological investigations. The same could be said about nerve conduction studies in patients with upper limb peripheral neuropathies. Only those who are in a lower socioeconomic group and those with private health insurance can undergo these investigations directly after GP consultation. This is something that may need to be reconsidered and debated at governmental level and is also beyond the scope of this paper.

A major limitation of this study is that referrals are determined based on the data as received from several different sources. Varying work practices and quality may affect the accuracy of reported figures.

The overall purpose of this paper was to highlight the ongoing issue of inappropriate or unnecessary referrals to the neurosurgical outpatient service and the potential benefit to be gained from a set of standardised referral guidelines, prepared with the aim of improving the service. The issue of direct referrals from GPs (primary care) to tertiary services (neurosurgery) may unnecessarily increase the burden on an already stretched service, and alternative referral pathways may warrant consideration.

There is clearly a rationale for GPs initiating investigation prior to neurosurgical referral. We believe that GPs need to be empowered with regard to the commencement of investigations. Such investigations aid triage and allow clinical resources to be deployed in a more appropriate manner. The authors recommend the formulation of a structured set of guidelines to assist GPs with referrals to the neurosurgical (and potentially to other surgical) service, but understand that these guidelines need to be flexible and applied with sound clinical judgment, experience and common sense.

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COMPETING INTERESTS

None declared.