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Neurology Inpatient Consultations and Referrals

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Abstract

Aims

St Vincent's University Hospital established an on-line referral system for the neurology consult service in 2007. We continue to review this service in order to seek improvement.

Methods

We examined multiple aspects of the electronic consult record received on inpatients from 2007 – 2018 (n=14,110).

Results

The average number of consults has increased from 13/week in 2007 to 33/week by 2018. The time between referral and the patient being seen has reduced from an average of 87 hours in 2007 to 6 hours in 2018. The majority of referrals (42%; n=6200) were from the emergency department (ED). 9% (n=1219) of all consults were discharged after neurology review. In 10% of cases (n=1437), the neurology team took over the care of the patient.

Conclusion

There has been a significant increase in demands on the neurology service in the last ten years. Despite this increased demand we have improved the efficiency of the service.

Introduction

Acute neurological problems are common, accounting for between 10-20% of medical admissions, with approximately one quarter requiring follow up in a neurology clinic.[3,4] The requirement for specialist input for these admissions are increasing.

'Neurophobia', a term coined by Jozefowicz in 1994, was described as "fear of the neural sciences and clinical neurology" among medical students[3] and this has been found to spill over into doctors in training, hospital consultants and also General Practitioners[4]

The increasing number of referrals, combined with limited confidence among medical students and junior doctors, might potentially lead to over-reliance on specialists.

The neurology department in St Vincent's University Hospital (SVUH) established an online consult service in 2007, which has had previously published reviews.[5,6] While this service has been continuously monitored, we have not comprehensively audited this service since 2014. A growing acute medical unit (AMU) within the hospital, along with a year-on-year increase in general medical admissions, is felt to have significantly contributed to the increasing number of referrals to the neurology consult service.

In our neurology department we have four full time consultants. We have access to thirteen (unprotected) in-patient beds for neurology patients. Consults are seen daily by a neurology registrar or consultant.

We reviewed the service from mid-2007 until 2018. We sought to quantify the increased demand on the service and to assess the impact on patient care. We also compared the service with our previously published data and that published from other hospitals.[7,8]

Methods

The referral form was an online form set up on the SVUH intranet network in 2007, designed by collaboration between the neurology team and the Information Technology (IT) department. (Image 1) To refer a patient for a neurology consultation, non-neurology doctors are required to fill in an electronic referral form (consisting of patient demographics, their location within the hospital, and drop down boxes outlining past medical history, possible presenting diagnoses, and results of investigations already performed). When the consult is seen by the neurology team, the consult is finalised by completing a number of drop-down boxes including the time the patient was seen, who the patient was seen by and the clinical outcome of the consult.

Neurology Referral Form

Please fill in the details below. Some fields are mandatory and the form will not save without them. Fields marked with an asterix "*" are mandatory, and the form will not save unless you have filled in all the information.

N.B. Please note that the referrals form will be checked twice daily up to 3PM. Any forms filled in after 3PM may not be checked until the following day. For urgent consults please call the registrar from the Neurology team.

MRN:*		Surname:*	
D.O.B:*	Please use the dd/mm/yyyy format	First Name:*	
Sex:	Male		
Consultant:*	AMU Consultant	Referring Doctor:*	
Department/Ward:*	ADC/OPD	Contact Number:*	
Urgency:*	Routine	Bed No.*	
Presenting Complaint:*			
Specific Consult Question:*			
Suspected Diagnosis:*	Brain Tumor Other:		
Duration:*	0 Hours 0 Days 0 Months		
Past History:*			
Family History:	Stroke: Epilepsy: MS: IPD: Other:		
Is Stroke Suspected	No		
If stroke is suspected what are the risk factors:	DM Smoker FHx BP Cholesterol Other		
Needs Inpatient Review:*	No	If No, in ADC?:	Yes
Previously seen by Neurology:*	No	If Yes, when:	Please enter year only
Why were they previously seen by Neurology?:			
Current Medication:*			
Smoker:*	No		

Examination Details

Gait: *	
Speech:*	
Intellect:*	
Cranial Nerves:*	
Motor Sensory:*	
Cerebellar:*	
Extrapyramidal:*	
Other:	

Investigations Requested:

Bloods ECG EEG EMG/NCS MRI-Brain MRI-Cervical MRI-Thoracic MRI-Lumbar CT-Brain CT-Cervical CT-Thoracic CT-Lumbar Other

Completed Results:

Bloods:*	Normal: Please check box for Yes (If not fill in box below with details)
ECG:*	Normal: Please check box for Yes (If not fill in box below with details)
EEG:*	Normal: Please check box for Yes (If not fill in box below with details)
EMG/NCS:*	Normal: Please check box for Yes (If not fill in box below with details)
MRI:*	Normal: Please check box for Yes (If not fill in box below with details)
CT:*	Normal: Please check box for Yes (If not fill in box below with details)
Other:	
Other comments:	
Possibly Medically Unexplained Symptoms:	No

Save Reset

Image 1: Screenshot of the neurology online referral system.

A total of 14,110 consults were reviewed using this intranet database. Data was downloaded via the information and technology (IT) department to an excel spreadsheet, including all data that was originally included by both the consulting team and the subsequent reviewing neurologist. Duplicate referrals were deleted.

Results

Consults were reviewed over the period August 2007 until October 2018 (n=14110). The average number of consults has increased from 13 per week in 2007 to 33 per week by 2018. Our busiest week occurred in 2017 with 47 consults.

The time between the patient being referred and being reviewed by the neurology team on average was approximately 87 hours (2 days, 15 hours) in 2008. This had been reduced to 6 hours on average in 2018. This is calculated by the time the consult is entered on the system, until the time the neurology team 'complete' the consult, by completing the last section of the online referral. The average time between referral and the patient being seen has steadily fallen with time (Table 1).

Year	Hours
2008	87
2009	58
2010	99
2011	24
2012	45
2013	29
2014	16
2015	13
2016	11
2017	4
2018	6

Table 1: Time between referral and patient being seen.

Thirty-eight per cent of consults were seen by a neurology registrar alone (n=5348) and 62% were subsequently seen by or discussed with by a consultant neurologist (n=8706). The remainder (n=56) were seen by an SHO and subsequently discussed with a consultant.

The majority of the consults (44%; n=6200) were seen in the emergency department (ED). This was either via a direct referral from the ED team or from the admitting medical teams whose patients were awaiting a bed on the wards.

The most common suspected diagnosis requiring referral to the neurology service was epilepsy (17%; n=2319). Others common reasons for referral included stroke (10%; n=1456), transient ischaemic attack (6%; n=830) and multiple sclerosis (5%, n=660). A suspected diagnosis of 'NULL' was entered in 39% (n=5564), indicating the referring doctor had not felt able to formulate a differential diagnosis at the time of referral.

Almost 10% (n=1219) of patients were discharged directly home from the ED after being seen by the neurology team. These included patients who were medically admitted and awaiting beds, or direct consults on patients in the Emergency Department.

In 10% of cases (n=1437), the neurology team took over the care of the patient directly and 5% of cases were referred to neurology for outpatient (n=746), rather than inpatient, review. The latter group was either due to the patient being discharged by the admitting team prior to review or following a phone discussion with the neurology team.

Advice regarding treatment alone or suggested investigations was recommended in the remainder of cases (76%; n=10709) (Table 2).

Outcome	**N=**	**%**
Discharge (same day)	1219	9
Take Over Care	1437	10
Referral to OPD	746	5
Advice Only	4641	33
Advice & Investigations	6067	43

Table 2: Outcome of all referrals.

A significant change in management was taken as one in which the clinical diagnosis, investigations or therapy was altered upon review by the neurology team. Within our study a change in management was observed in 67% (n=8043) of patients (excluding the group in which 'Advice Only' was given, as this group was usually redirected to other specialties or no neurological input was required).

Table 3 shows how our current numbers compare to previous studies done within our own department.[1,2] The number of referrals per week has increased on average by 20 per week for the duration of the online component (approximately 250%) and 23 per week on average since the use of the paper based system.

	Paper based	Previous Study of Online System – 2007-2008 (1 yr)	Current study of Online System – 2007 – 2018 (11 yr)
Number of referrals	254	1016	14110
*significant change in management	70%	79%	67%
Time from referral to review	'Most patients within 48hr'	0-24: 77% 24-48: 11.8% >48: 11.2%	2007: 87 hr 2018: 6 hr
Take over care	6%	13%	10%
Patients seen in ED	No info provided	40%	44%
Same day discharge	No info provided	13%	9%
Average number of referrals	10/week	15/week	2007: 13/week 2018: 33/week

** A significant change was taken as one in which the clinical diagnosis, investigations or therapy was altered upon review by the neurology team (compared to that of the admitting team or ED service.*

Table 3: Comparison of the current and previous studies from our department.

Discussion

The introduction and subsequent maintenance of an online neurology referral system has significantly enhanced the delivery of the neurology service within our hospital. In the last eleven years, the time between a patient being referred and being seen has reduced by about 81 hours, despite the number of referrals increasing in this time.

It is important to note during this time two full time consultant and two full time registrar posts were added to our department. However, an increase in staffing alone would likely not account for this improvement as we must also consider the growing burden on outpatient services. In the same time period, the numbers of out-patients seen in our department has increased from approximately 3,000 per year to almost 9,000 per year. We are now running 18 out- patient clinics a week.

Therefore, we would suggest that ongoing use of the online component of our referral service has been effective in streamlining the service and making it more efficient. It benefits, for instance, planning workload and a 'route' for the day as you are aware in advance of wards you need to visit, and this can easily be updated with access to any hospital computer. It also saves the time taken handwriting referrals and then delivering them to the neurology team. We also re-distributed the staff by dividing the roles among team members such that we rotated between periods each year dedicated to seeing referrals, looking after our in-patients and running out-patient clinics.

A suspected diagnosis of 'NULL' was entered in 39% of cases (n=5564), indicating the referring doctor had not felt able to formulate a differential diagnosis at the time of referral. We speculate that the current efficiency of our service may lead to a lower threshold for neurology referral. It may also have an impact on the neurological education of younger doctors in training as they are not required to enter a suggested diagnosis as consults are seen so quickly. However, we do feel it is still important in terms of prioritising patient care to maintain this efficiency.

In contrast to our previous review of the electronic system there were fewer patients taken over by the neurology team (10% vs 13%) and a significant change in management also decreased from 79% to 67%[2]. However, with increasing 'neurophobia' and the possibility of a lower threshold for neurology specialist referral,[5,6] this could be increasing the number of potentially 'inappropriate' consults, leading to this change in figures.

A previous study in another Irish tertiary centre with a paper-based system showed similar results to our previous paper system with stroke accounting for a larger proportion of diagnoses (22%)[7]. The number of patients whose care was taken over remained at 9% and it took on average 48 hour for a neurology consultant review. This agreed largely with figures from our previous paper-based system.

A study from 2011[9] in the UK showed that the neurology team took over care of approximately 8% of patients. Similar to previous studies, cerebrovascular disease and epilepsy made up the most frequently referred diagnostic categories. It also recorded the average time spent during a consultation (20.6 minutes with a range of 5 to 120 min) which would be helpful in assessing the burden of the consultation service to the neurology department. That study was also based on a paper system.

With 5% of patients directly deemed to only require outpatient referral (and 9% directly discharged by the neurology team this has led to a significant number of 'beds saved' (n=1965 over the study period), as these patients would likely have been admitted to or remained on medical wards if they had not been seen in a timely fashion by the neurology team, adding, we believe, to the importance of continually reviewing this service.

We would hope that further medical education measures[10] may lead to a much-needed reduction in potentially unnecessary consultations to our service, which may also extend to demands on our outpatient services. However, there is also a real possibility that a very efficient referral service could do just the opposite in that young doctors' first response to a neurology problem will be to refer safe in the knowledge they will be seen quickly. To help mitigate this possibility this we plan to educate new non neurology doctors in what is, and what is not, an appropriate neurology referral in the coming years. With this in mind we run a twice yearly week of large group tutorials focusing on the teaching of neurology to undergraduate students. We continue to audit these to assess benefit and indeed there has been documented short-term benefit[11], however longer-term follow-up on this within our centre is yet to be done. If a successful measure this could be extended to other specialities outside of neurology.

Other measures which could be considered could include registrar to registrar, or indeed consultant to consultant referrals, however this may not be feasible within the realms of most busy hospitals. It would appear given the number of patients who required out-patient follow up or were directly discharged following neurology advice that the potential of a Rapid Discharge Clinic, where patients would receive short term follow up may be beneficial. However, this is currently not an option in our service.

Declaration of Conflicts of Interest:
There are no conflicts of interest to declare.

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