

Paper

Timeliness of diagnosis in Motor Neurone Disease: a population-based study.

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SUMMARY

Following the observation from our experience with the Northern Ireland Motor Neurone Disease (MND) register that excessive delays appeared to exist in the diagnosis of patients with MND, we performed a population-based study of the length and factors involved in the diagnostic process. In 73 patients we found that the median time to diagnosis from symptom onset was 15.6 months, being shorter in bulbar onset patients and longer in females or those presenting with non-specific gait disturbance. We divided this interval into three time periods – symptom onset to first medical contact, first medical contact to neurology referral and neurology referral to diagnosis. The time period from first medical contact to neurology referral was the longest of the three periods studied indicating that appropriate timely referral of patients to neurologists was responsible for the greatest delay in making a diagnosis of MND. We propose that improving the accessibility of neurological services could potentially reduce the time to diagnosis by at least three months.

INTRODUCTION

From our experience in setting up the Northern Ireland Motor Neurone Disease (MND) register, in August 2004, we felt that excessive delay existed in the diagnosis of patients with MND. Timeliness is an essential component of high quality health care¹ particularly in such a devastating diagnosis as MND. Earlier diagnosis in patients could mean earlier commencement on riluzole, the only licensed treatment for MND, as well as a greater opportunity to become enrolled in clinical drug trials. It is also likely that significant psychological stress accompanies the wait for a diagnosis. A study by Johnston et al² reported that the majority of MND patients described positive aspects of being given their diagnosis, particularly because they now had a 'label' for their condition. Furthermore, earlier diagnosis allows patients more time to make personal and financial adjustments and make plans for the future, including the modification of their home to cope with impending disability.

The latency from symptom onset to diagnosis in MND documented in the literature has shown little improvement or change over the last 40 years and figures range from 10.6-17.5 months³⁻¹³. Two recent studies^{4,10} looked at the factors leading to such delay. The first study¹⁰ ascertained patients solely via the Motor Neurone Disease Association (MNDA) and collected data directly from patients. Using this method one cannot assess the validity of the diagnoses and in addition it

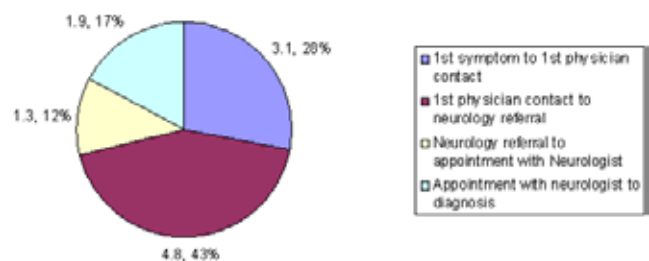


Fig 1. Median time periods (months)

is very unlikely that patients will be able to recall accurately the details of their diagnostic process. Although the second study⁴ used data from structured case reports completed by consultant neurologists we feel the most robust and accurate method to examine the diagnostic process in MND would be to review GP (General Practitioner) records. In the vast majority of patients, the GP would be the first point of contact for patients and GP records would contain all correspondence between various hospital specialists. In addition, our study has the added advantage of being population-based due to a well maintained register of MND patients in Northern Ireland.

Using the MNDA's 'Standards of Care' document (figure 1), we performed a population-based case note review to study the length of the diagnostic process of MND and the contributing factors using both primary care and hospital records.

METHODS

We used the MNDA's 'Standards of Care' for our study. Ethical committee approval was obtained for the setting up of an MND register. We identified all patients from the Northern Ireland MND register prevalent on 1st January 2006. All were diagnosed by a consultant neurologist and fulfilled the original El Escorial criteria, and gave written informed consent for their medical notes to be examined. All GP and hospital notes were examined (by CD and AD). Data was collected using a

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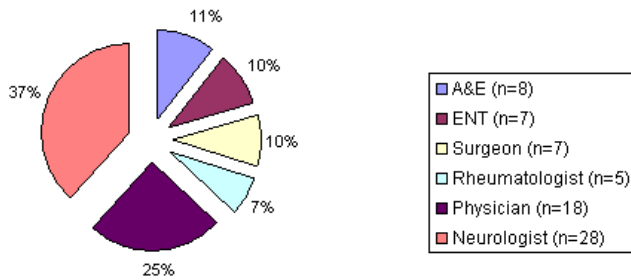


Fig 2. 1st Specialist seen on referral from 1st medical contact

structured form that focused on the time periods from initial medical contact to diagnosis as well as the nature or specialty of the physicians involved

We used median instead of mean values in calculating time periods because the prevalent population (figure 2) included some long living MND patients who had presented insidiously.

RESULTS

There were 83 patients with MND prevalent on the register on the 1st January 2006 and we were able to include 73 patients providing 88% ascertainment. We were unable to obtain consent from nine patients while another had no primary care records available due to their diagnosis being made outside Northern Ireland. These cases were excluded. Ascertainment of cases was 99.5% based on unpublished results from a capture-recapture analysis performed on a prevalence study on 30th June 2005. Capture-recapture analysis is a method of counting the total number of cases within a population from two or more overlapping incomplete but distinct sources which allows estimation of the number of unobserved cases and can determine the completeness of ascertainment¹⁴. We used multiple sources to ascertain cases and minimise bias.

The median time to diagnosis from symptom onset (TTD) was 15.6 months and the time period from first physician contact to neurology referral was proportionately the longest (figure 1). There was no correlation between TTD and age. TTD was longer in females, 20.9 months, compared to males, 13.9 months, and this was due largely to the time period from neurology referral to diagnosis (2.7 months in males and 5.2 in females).

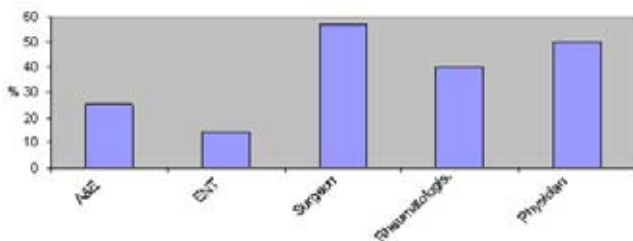


Fig 3. Appropriate onward referral from non-neurologists

The impact of the physicians involved

The GP was the first physician contacted in 67/73 or 92% of cases. Three patients attended the Accident and Emergency department when presenting first and for two it was unknown. One patient who had frontotemporal dementia associated MND presented to a psychiatrist with concerns from her

family that she had depression. The first specialist seen was the neurologist in 28/73 (37%) cases (figure 2). Appropriate onward referral to neurologists from the first specialist seen ranged from 14 to 57%. Referral was lowest in those seen by ENT surgeons (7 patients, figure 3). The highest level of appropriate onward referral was by surgeons (orthopaedic and neurosurgeons) at 57%. One might have expected that physicians would have referred more than 50% of the patients they saw onto a neurologist.

TABLE I

Standards of care used for the study

Standards of care to achieve quality of life for people affected by Motor Neurone Disease
Before diagnosis:
Speed in acquiring the correct diagnosis through
(a) Early recognition of symptoms which might suggest the diagnosis
(b) Earliest possible assessment by neurologist

The impact of site of onset of disease and presenting symptoms

TTD was shorter in bulbar onset (13.5 months) as compared to limb onset disease (17 months) particularly the time period from neurology referral to diagnosis which was shorter in bulbar onset (2.2 months) as compared to limb onset disease (4.6 months). The TTD in bulbar onset disease was 24.7 months for those initially referred to an ENT surgeon (7/19), and only 4.9 months for those referred directly to a neurologist (3/19) and 12.2 months for the remaining 9/19 patients referred to other specialists.

Although responsible for only 8% of patients, non-specific gait disturbance was associated with the longest TTD due to a delay within all time periods (Table III). This group presented with gait disturbance without evidence of weakness or foot drop, and tended to have upper motor neurone predominant MND. Whilst MND is believed to be a painless condition many patients do complain of pain not associated with identifiable trauma as was the case in four of our patient group.

TABLE II.

Demographics & Clinical details

Male : Female ratio	1.4 : 1
Site of disease onset	Bulbar (n=19) Limb (n=52) Cognitive (n=2)
Mean age at symptom onset	60 years (SD 13.7)
Mean age at diagnosis	61.8 years (SD13.6)

TABLE III.

Median time periods dependent on nature of predominant 1st symptom

Time periods	Median time (months)					
	Weakness (n=36, 50%)	Bulbar (n=19, 26%)	Cognitive (n=2, 3%)	Non-specific gait disturbance (n=6, 8%)	Fasciculation / Cramps (n=6, 8%)	Pain (n=4, 5%)
Symptom onset to 1 st physician contact	2.6	2.0	5.8	11.0	9.6	0.1
1 st physician contact to neurology referral	4.2	4.8	5.4	9.6	2.4	10.7
Neurology referral to diagnosis	4.8	2.2	2.2	13.3	2.7	0.8
Symptom onset to diagnosis (TTD)	15.5	13.5	13.1	33.6	15.6	13.0

Misdiagnosis

The final diagnosis of MND was given to the patient by a neurologist in 69/73 (95%) of cases and a general physician in 4/73 (5%) of cases although all patients had their diagnosis confirmed by a neurologist as is appropriate. Initial incorrect diagnoses were made in 20/73 cases (27%). These falsely negative diagnoses were made by neurologists in 7 of the 69 patients, by GPs in 3 before onward referral and by non-neurology specialists in 10 of the 45 cases seen before being referred onto neurologists. Table IV lists the range of diagnoses. TTD was longer in the group who were misdiagnosed (26.3 months) when compared to those who were not (13.8 months). No correlation was found between misdiagnosis and age.

DISCUSSION

The TTD in our study was 15.6 months and the longest median time period responsible for this latency was that time spent with a physician before a neurology referral was made (4.8 months). Only 37% of patients were referred to a neurologist as the first specialist and of those referred to non-neurologists only 40% were appropriately referred on to a neurologist. If 80% of patients were to be referred to a neurologist as the first specialist then the median TTD could be reduced by just over 3 months.

When one considers that the current survival of MND in Ireland is 16.4 months from diagnosis until death¹⁵, a wait of 15.6 months from symptom onset to diagnosis appears excessive. The MNDA's standards of care before diagnosis (table I), detail that speed in achieving a diagnosis should be attained through 'early recognition of symptoms' and 'earliest possible assessment by a neurologist'. These two key areas appear to be responsible for the greatest delay in this patient group. Our results indicate that GPs and non-neurology specialists are not referring patients to neurologists quickly enough, in particular ENT surgeons. This may be due to a combination of poor recognition of neurological signs and

symptoms however it is more likely that GPs are disillusioned with the waiting times for neurology outpatient appointments (6 – 12 months at the time of this study) and simply try to find other specialists that might be able to help. Nonetheless presentations such as non-painful gait disturbance, progressive bulbar dysfunction and fasciculations, when they are associated with wasting or weakness, always necessitate neurological assessment. ENT surgeons need also to be aware that progressive bulbar dysfunction not due to a structural cause requires urgent referral to a neurologist.

What can one learn from this study and what can be done to help? The time period from presentation to neurology referral is the best place to target improvements - GPs need to refer appropriate patients directly to neurologists. We know that new neurological outpatients are more efficiently managed by neurologists than general physicians¹⁶. Furthermore

TABLE IV.

Falsely negative diagnoses

Diagnoses
Cervical Spondylosis
Nothing
Neuropathy
Lumbar disc prolapse
Capsulitis of shoulder joint
Myelopathy
Multiple sclerosis
Parkinson's Disease
Stroke
Carpal Tunnel Syndrome
Vascular pseudobulbar palsy
Osteoarthritis
Rhinitis
Depression

the results from this study indicate that neurologists are successfully prioritising referrals on patients with MND, with a median waiting time of 1.3 months from neurology referral to appointment with the neurologist, and GPs should be encouraged by this. Ultimately making neurologists more accessible would encourage GPs to make appropriate referrals for patients with neurological symptoms or signs. One approach that might help would be the introduction of an email triage system as examined by Patterson et al¹⁷. This allows a neurologist to deal with appropriate GP referrals using email and shorten the time for a clinic appointment. The recent establishment of the Northern Ireland MND Care Centre may also help as the care centre coordinator can accept referrals from non-neurologists concerning patients with suspected MND and 'fast track' them through the system.

The strengths of our study are that this is a population-based study with a high level of ascertainment and both GP and hospital records were used to allow as accurate information to be collected as possible. This robust methodology is lacking from previous studies. The weakness of this study is that it is from a single region and does not necessarily reflect practice in the rest of the UK and beyond. It is likely that similar trends exist within the rest of the UK.

Our TTD was consistent with that documented in the literature of 10.6-17.5 months³⁻¹³ although our misdiagnosis rate of 27% was at the lower end of reported figures 27-61%^{4,10,18,19}. In a survey involving Germany, Spain, Italy, USA, Brazil and Argentina⁴, 63% of patients were referred directly to a Neurologist from the GP. In a study performed in England and Wales the reported rate was 47%¹⁰. Although these rates seem much better than our 37%, these studies were not population based. If the reported rates in these studies were indeed representative of the population from which they were drawn it may be in part due to the increased accessibility of neurologists in some European countries compared to Northern Ireland. Both studies noted that the main delay appeared to be in the time period from presentation to neurology referral.

With improvements in the accessibility of neurological services we feel that the median time period from presentation to neurology referral of 4.8 months could be reduced by three months or more. As this represents approximately 10% of the average survival of MND patients from symptom onset, it would be an effort worth making.

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Conflict of interest – none declared.

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