Investigation of fatigue by Australian general practice registrars: a cross-sectional study

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ABSTRACT

INTRODUCTION: Fatigue is the most common undifferentiated problem presenting in general practice. Previous studies have shown that this presentation leads to multiple investigations. There is no published literature describing the management of patients with fatigue by general practice (GP) registrars.

AIM: To document the investigation-ordering behaviour of GP registrars in managing patients with a new diagnosis of unexplained fatigue.

METHODS: This was a cross-sectional analysis of data from Registrar Clinical Encounters in Training (ReCEnT), an ongoing cohort study of GP registrars' consultations. We established the prevalence of new diagnoses of unexplained fatigue and associations with that diagnosis, the rate of test ordering and the number and types of investigations ordered.

RESULTS: 644 registrars contributed data from 68 986 encounters. In 0.78% of patient encounters, a new diagnosis of unexplained fatigue was made. Pathology was ordered in 78.4% of these problems (versus 18.1% in non-fatigue problems), at a rate of 488 tests per 100 new fatigue problems.

DISCUSSION: Our study suggests that unexplained fatigue elicits a non-rational approach to test ordering by registrars. These findings contribute to the understanding of GP registrar management of fatigue, and undifferentiated presentations more broadly, and suggest educational approaches to improve practice, including dealing with uncertainty.

KEYWORDS: Diagnostic tests, routine; education, medical; family practice; fatigue; general practice

Introduction

Fatigue is 'that state... characterised by a lessened capacity or motivation for work..., usually accompanied by a feeling of weariness, sleepiness, irritability, or loss of ambition'.[1] It is derived from the Latin *fatigare*, to tire. Fatigue is the most common undifferentiated complaint presenting to general practitioners (GPs).[2] In 2006–8, unexplained fatigue (a presentation of fatigue with no clear cause after clinical assessment[2]) was managed at a rate of 0.7 per 100 encounters in the Australian general practice setting, equating to over 700 000 encounters nationally per year.[3] Due to its non-specific nature and potential link to serious disease, fatigue is a challenging problem to manage in general practice.

The causes of fatigue are many and diverse. However, significant underlying somatic pathology is uncommon in the primary care setting, with a recent large Dutch study reporting an incidence of only 8.2%.[4] This is reflected in the low yield of clinically important abnormal test results in the investigation of patients with fatigue in general practice.[5–10] Very often, patients never receive an aetiological explanation for their fatigue.[4,11]

Australian guidelines recommend limiting investigation in the initial assessment of fatigue.[12]

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Despite this, presentations of fatigue lead to high rates of test ordering. In 2012–13, pathology was ordered in 66.2% of patients presenting to Australian GPs with fatigue.[13] Moreover, when tests were ordered for those patients, it was at a rate higher than for any other problem managed.

Vocational training is a critical period in the development of future patterns of GPs' clinical practice, including the development of test-ordering behaviour.[14] General practice training in Australia is based on an 'apprenticeship model', where registrars see patients independently but under the general supervision of accredited GP supervisors.

In this study, we addressed the research question of the frequency of registrars encountering unexplained fatigue and their test ordering for this problem. We aimed to establish the prevalence of registrars encountering unexplained fatigue and associations with this diagnosis. We also aimed to establish the rate of test ordering for problems classified as unexplained fatigue and to document the types of tests ordered.

Methods

Participants

This was a cross-sectional analysis of data from the Registrar Clinical Encounters in Training (ReCEnT) cohort study. The study methodology has been described elsewhere.[15] Briefly, ReCEnT is an ongoing cohort study of GP registrars' in-practice clinical experiences undertaken in four general practice regional training provider (RTPs) settings, encompassing urban, rural and remote practices in four Australian states.

In ReCEnT, characteristics of participating registrars and their training practices are documented. Registrars record the details of 60 consecutive patient encounters, each six-month training term. Data collection is conducted around the midpoint of the training term.

Consultation data reported includes patient demographics, duration of consultation, diagnoses or problems managed, investigations ordered, prescriptions written, follow-up arranged, and referrals made. Problem/diagnosis managed is defined as the 'single most likely provisional diagnosis'. In cases where there is no clear provisional diagnosis, registrars are asked to record the presenting problem (e.g. headache). Registrars are asked to record at least one and up to four problems/diagnoses per patient encounter. Only problems/diagnoses actually dealt with at the encounter are recorded. Registrars also record whether the problem/diagnosis is old or new (where new is either a new problem to the patient, or a new episode of a recurrent problem).

Registrars are asked to record up to 12 pathology tests per encounter and each is linked to the problem/diagnosis managed by circling a number on the encounter form.

Procedures

This study used data from eight collection periods during 2010–2013. For the purposes of the study, we considered fatigue as synonymous with tiredness and malaise. We analysed all consultations in which patients aged 15 years and older were diagnosed with a new problem of unexplained fatigue. We excluded paediatric patients, as fatigue in children is likely to be a markedly different entity to adult fatigue.[16]

All documented diagnoses that were coded as 'weakness/tiredness' (ICPC-2 code A04) in the International Classification of Primary Care, Version 2[17] were grouped together as 'unexplained fatigue'. As registrars were instructed to record the most precise diagnosis possible, all presentations of fatigue that had a probable aetiology, such as depression or anaemia, would have been recorded as such and not included as unexplained fatigue. We did not include old (existing) diagnoses of fatigue.

Outcome factors included rate and type of investigations ordered for new diagnoses of fatigue.

Other variables

Other variables in this analysis relate to the registrar, patient, practice and consultation. Registrar factors were age, gender, training term, training pathway enrolled in (general or rural; rural pathway registrars train exclusively in rural locations), place of medical qualification (Aus-

tralia or international), and full-time/part-time status. Patient factors were age, gender, Aboriginal or Torres Strait Islander status, new patient to the practice, and new patient to the registrar. Practice factors included rurality, socioeconomic area of the practice location, practice size (number of GPs), and if the practice routinely 'bulk-bills' (that is, there is no financial cost to the patient for the consultation). Consultation factors were duration of consultation, and whether pathology was ordered or a specialist referral made.

Statistical analysis

We conducted univariate analyses of associations of management of new fatigue using simple logistic and linear regression within generalised estimating equations (GEEs) to account for clustering of patients within registrars. All analyses were done with Stata/SE 11.2. The unit of analysis was the individual problem/diagnosis rather than the consultation.

Ethics approval for the study was obtained from the Human Research Ethics Committee of the University of Newcastle, NSW, Australia (Ref. H-2009-0323). Registrars were required to participate in the educational component of the programme but gave informed consent for their de-identified aggregated data to be used for research purposes.

Results

General practice registrars

Six hundred and forty-four individual registrars contributed data (response rate 94.3%). Overall, 66.0% (95% confidence interval [CI] 62.3–69.7) of the registrars were female, with an overall mean age of 32.8 years (standard deviation [SD] 6.6). Registrars who obtained their primary medical degree in Australia comprised 74.5% (95% CI 71.2–77.9) of registrars.

The 644 registrars contributed data from 1424 registrar terms, comprising 68 986 encounters. Nearly three-quarters (73.3%) of registrar terms were in the first year of training. Characteristics of participating registrars, practices and registrar terms are shown in Table 1.

WHAT GAP THIS FILLS

What we already know: Fatigue is a common and challenging presentation in general practice that leads to high rates of investigation ordering. Non-rational test ordering is costly and can cause patient harm.

What this study adds: General practice registrars order approximately double the number of tests general practitioners order when investigating unexplained fatigue. Rational test ordering is a critical area for education and training of general practice registrars.

Diagnoses of fatigue

In 1.13% (n=777; 95% CI 1.05–1.21) of all encounters, a diagnosis of fatigue was made. Of these, 69.0% (n=536; 95%CI 65.6–72.1) were new problems, comprising 0.78% of all registrar encounters. Overall, the mean age of patients with a diagnosis of new fatigue was 40.6 years (SD 17.5), and 74.5% (95% CI 70.7–78.2) were female.

Associations with new fatigue diagnoses

Diagnosis of a new fatigue problem was associated with the patient being female, younger, and new to both the registrar and practice. Consultations with patients with new fatigue were significantly longer (20.7 compared to 17.3 minutes) and involved more problems (2.2 compared to 1.6 problems per encounter) than other consultations. Patient and consultation characteristics and their associations with a new diagnosis of fatigue are shown in Table 2.

Rates of test ordering

Pathology was ordered at a rate of 488 tests per 100 new fatigue problems (SD 345), and 78.4% of encounters (patients seen) involving a new diagnosis of fatigue resulted in at least one test being ordered. This was significantly different to encounters not involving a new diagnosis of fatigue (53.5 pathology tests per 100 problems (SD 156.4; $p<0.001$), and 18.1% of encounters (patients) resulting in at least one test being ordered ($p<0.001$).

In only those problems where pathology tests were ordered, there was a significantly greater number of tests ordered for fatigue (627 tests per

Table 1. Registrar, registrar term and practice characteristics

Variable	Class	n	%	(95% CI) or Mean (SD)
Registrar variables (n=644)				
Gender	Male	219	34.0%	(30.3–37.7)
	Female	425	66.0%	(62.3–69.7)
Training pathway	General	494	77.0%	(73.7–80.2)
	Rural	148	23.1%	(19.8–26.3)
Qualified as a doctor in Australia	No	164	25.5%	(22.1–28.8)
	Yes	480	74.5%	(71.2–77.9)
Age (years)				32.8 (6.62)
Registrar term and practice variables (n=1424)				
Training term	Term 1	556	39.1%	(36.5–41.6)
	Term 2	487	34.2%	(31.7–36.7)
	Term 3	306	21.5%	(19.4–23.6)
	Term 4	75	5.3%	(4.1–6.4)
Working full-time	No	302	21.7%	(19.5–23.9)
	Yes	1089	78.3%	(76.1–80.5)
Practice routinely bulk bills	No	1190	83.6%	(81.6–85.5)
	Yes	234	16.4%	(14.5–18.4)
Number of GPs working at the practice	1-4	453	32.5%	(30.1–35.0)
	5+	940	67.5%	(65.0–69.9)
Rurality of practice	Major city	825	58.0%	(55.4–60.5)
	Inner regional	423	29.7%	(27.3–32.1)
	Outer regional or remote	175	12.3%	(10.6–14.0)
SEIFA Index (decile) of practice*				988.8 (67.3)

* Socioeconomic Index for Area (SEIFA) Relative Index of Disadvantage

SEIFA scores are standardised to a distribution where the mean equals 1000 and the standard deviation is 100

100 new fatigue problems; SD 256) compared with non-fatigue problems (296 tests per 100 non-fatigue problems; SD 252; $p<0.001$).

Types of tests ordered

The most commonly ordered tests were full blood count (FBC), ordered in 70.3% of patients with new fatigue, thyroid function tests (TFT) ordered in 63.8%, electrolytes and creatinine (EUC) ordered in 57.5%, ferritin/iron studies ordered in 53.2%, liver function tests (LFT) ordered in 50.8%, and vitamin B12 ordered in 30.6%. Erythrocyte sedimentation rate (ESR), ordered in 15.1% of patients with new fatigue, and C-reactive protein (CRP), ordered in 15.1%, did not rank in the top 10 tests ordered (Table 3).

Discussion

General practice registrars manage a new diagnosis of unexplained fatigue in 0.78% of consultations and order pathology in nearly four out of five (78.4%) of these patients. In new fatigue problems where a test was ordered, the mean number of tests ordered was 6.3, twice the rate of non-fatigue related problems.

Comparison with other literature and interpretation of findings

Compared to established Australian GPs, registrars encountered more patients complaining of fatigue overall (1.13 versus 0.7 per 100 encounters), and manage more patients with

Table 2. Associations of new fatigue diagnosis with patient and consultation factors

Variable	Class	Other problems (n=68 450)	New fatigue (n=536)	Univariate	
				OR (95% CI)	P-value
Registrar factors (n=68 986)					
Term	1	26 680 (39.0%)	206 (38.4%)	Referent	
	2	23 258 (34.0%)	196 (36.6%)	1.1 (0.9–1.4)	0.409
	3	14 839 (21.7%)	110 (20.5%)	1.0 (0.8–1.3)	0.826
	4	3673 (5.4%)	24 (4.5%)	0.9 (0.6–1.4)	0.647
Patient factors (n=68 986 encounters)					
Patient age (years)	Mean (SD)	47.4 (19.6)	40.6 (17.5)	0.98 (0.98–0.99)	<0.001
Patient age group (years)	15–24	10 480 (15.3%)	106 (19.8%)	2.5 (1.8–3.5)	<0.001
	25–44	22 467 (32.8%)	254 (47.4%)	2.8 (2.1–3.8)	<0.001
	45–64	20 868 (30.5%)	118 (22.0%)	1.4 (1.0–1.9)	0.032
	65+	14 635 (21.4%)	58 (10.8%)	Referent	
Patient gender	Male	24 607 (36.5%)	133 (25.5%)	Referent	
	Female	42 764 (63.5%)	388 (74.5%)	1.7 (1.4–2.0)	<0.001
Aboriginal or Torres Strait Islander	No	67 796 (99.0%)	528 (98.5%)	Referent	
	Yes	654 (1.0%)	8 (1.5%)	1.6 (0.8–3.2)	0.199
Non-English-speaking background	No	64 493 (94.2%)	500 (93.3%)	Referent	
	Yes	3957 (5.8%)	36 (6.7%)	1.1 (0.8–1.6)	0.449
Patient status	Returning patient	31 953 (46.7%)	174 (32.5%)	Referent	
	New to the registrar	32 085 (46.9%)	300 (56.0%)	1.7 (1.4–2.1)	<0.001
	New to the surgery	4412 (6.5%)	62 (11.6%)	2.6 (1.9–3.5)	<0.001
Consultation factors (n=68 986 encounters)					
Number of problems	Mean (SD)	1.6 (0.8)	2.2 (0.9)	1.9 (1.8–2.1)	<0.001
Consultation duration (mins)	Mean (SD)	17.3 (9.3)	20.7 (8.3)	1.03 (0.02–0.04)	<0.001
Test ordering (n=111 625 problems)					
Rate of pathology test ordering (number of tests per 100 problems)*	Mean (SD)	53.5 (156.4)	487.9 (345.3)	1.0 (1.0–1.0)	<0.001
Rate of pathology test ordering if pathology ordered (number of tests per 100 problems)†	Mean (SD)	296.4 (252)	627 (256)	1.0 (1.0–1.0)	<0.001
Proportion of consultations where one or more pathology tests ordered (%)	No	90 997 (81.9%)	116 (21.6%)	Referent	
	Yes	20 092 (18.1%)	420 (78.4%)	16.4 (13.2–20.3)	<0.001

* The rate of pathology test ordering is the number of tests ordered per 100 problems overall.

† The rate of pathology test ordering if pathology is ordered is the number of tests ordered per 100 problems in ONLY those problems where tests are ordered.

Table 3. Top 10 pathology tests ordered

Pathology test	n	% of all pathology ordered for new fatigue problems	(95% CI)	% of new fatigue problems in which specific test ordered	(95% CI)
Full blood count	377	14.35	(12.9–15.9)	70.3	(63.4–77.8)
Thyroid stimulating hormone	342	13.02	(11.7–14.5)	63.8	(57.2–70.9)
Electrolytes, urea and creatinine	308	11.72	(10.5–13.1)	57.5	(51.2–64.3)
Iron studies	285	10.85	(9.6–12.2)	53.2	(47.2–59.7)
Liver function tests	272	10.35	(9.2–11.7)	50.8	(44.9–57.1)
Vitamin B12	164	6.24	(5.3–7.3)	30.6	(26.1–35.7)
Glucose	148	5.63	(1.8–6.6)	27.6	(23.3–32.4)
Vitamin D	121	4.61	(3.8–5.5)	22.6	(18.7–27.0)
Folate	118	4.49	(3.7–5.4)	22.0	(18.2–26.4)
Lipids profile	83	3.16	(2.5–3.9)	15.5	(12.3–19.2)

new unexplained fatigue (0.78 versus 0.35 per 100 encounters).[3] However, comparisons with established GPs must be interpreted with caution. The demographics of established GPs and GP registrars differ, with established GPs being proportionately older and more likely male.[13] The greater diagnostic acumen (and therefore capacity to apply a diagnostic label) of the established GPs may have reduced the apparent rate of unexplained fatigue presenting to this group, and contributed to the difference in rates with registrars. As well, our study excluded paediatric consultations, unlike the studies of established GPs.

The prevalence of diagnoses of unexplained new fatigue in our study was broadly similar to international studies involving similar populations.[6,7,18]

In our study, patients with fatigue were more likely to be younger (with the highest rates in those aged 15–44 years) and female. This is consistent with other studies of patients with fatigue.[4,6–8,10,11] We found evidence for consultations involving the management of fatigue to be more complex (longer duration of consultation and involving more problems), and this has also been demonstrated in established GPs.[3]

When investigating a patient with new diagnoses of fatigue, established Australian GPs ordered pathology in 59.6% of cases, at a rate of 280 tests per 100 fatigue problems.[3] High overall rates of test ordering have also been found in another Australian study[9] and internationally.[6,8,11] However, this is substantially less frequently than the test ordering rates of registrars (78.4% of patient encounters; 488 tests per 100 problems) in our study.

The most commonly ordered tests by registrars in the investigation of new fatigue were broadly similar to those in both Australian[3,10] and international studies.[6,7,8] However, compared to Australian GPs investigating new fatigue, registrars ordered roughly twice as many TSH, LFT, lipids and blood sugar level (BSL) tests; three times as many EUC tests, and four times as many Vitamin B12 tests.[3] ESR and CRP test ordering rates were similar. Despite caveats around direct comparison, our findings suggest non-rational test ordering by registrars, encompassing high rates of both more appropriate tests (e.g. TSH), and less appropriate tests (e.g. Vitamin B12). In particular, the high rate of (probably inappropriate) vitamin D and lipids tests, and low rate of (recommended) ESR testing, further suggests non-rational test ordering.

The number and type of tests ordered by registrars were not in keeping with international guidance on the management of undifferentiated fatigue, which advocate a period of watchful waiting and then limited initial testing.[12,19,20]

High test ordering rates might reflect registrars' recent hospital-based experience, a setting with a much greater focus on diagnostic certainty and a more acutely unwell patient population. In the primary care setting, it has been shown that a limited set of blood tests (haemoglobin, ESR, BSL and TSH) is nearly equal to a more extensive set of investigations in diagnosing serious pathology.[21]

Strengths and limitations of this study

This is the first time GP registrars' investigation of fatigue has been described. The registrars had similar demographics (age and gender) to the national GP registrar cohort.[22] We conducted this study across four Australian states, making the findings broadly generalisable to Australian general practice training overall.

We chose to analyse data by problem managed, rather than by reason for encounter. This meant that presentations of fatigue where the registrar was able to make a firm provisional diagnosis, such as depression, were excluded and only truly undifferentiated presentations of fatigue were included.

Our methodology and instructions for data collection were similar to that used in a study documenting the national clinical activity of Australian GPs.[13] As well, we coded our data using ICPC2-plus, thus enabling comparison with other Australian studies using this validated international standard for classifying primary care data.[23]

One limitation of this study is that we were unable to determine the duration of fatigue prior to presentation. As the duration of symptoms is one trigger for initiation of investigations, we are therefore unable to state whether investigations were appropriately timed.

Implications for practice

Our study suggests that undifferentiated presentations, such as unexplained fatigue, elicit a non-rational approach to test ordering by registrars (as with GPs). Non-rational test ordering incurs significant potential costs, both financial and to patient safety.[24] Our findings are thus of importance, and highlight some specific areas on which to target education and training. These include rational test ordering, management of clinical uncertainty, and evidence-based practice, all core objectives of the Royal Australian College of General Practitioners curriculum.[25]

Investigation of fatigue provides an excellent opportunity for teaching rational test ordering skills. Indeed, weakness/tiredness has been identified as the clinical problem that causes registrars most difficulty in test ordering.[26] A number of teaching and learning strategies have been described.[14] These include a thorough clinical assessment, practising with a patient-centred approach,[27] using clinical guidelines, avoiding batch testing, random case analysis,[28] and test auditing.[29] There is evidence that targeted education and feedback around test ordering can influence GP behaviour,[30,31] including information on the costs of tests.[32]

Dealing with uncertainty is an essential skill for GPs. Fatigue typifies the undifferentiated GP presentation, being vague, common and associated with a low pre-test probability of serious disease.[4] One of the most important drivers for 'superfluous' test ordering in the context of an unexplained complaint like fatigue is diagnostic uncertainty.[33] Registrars, with their relative inexperience and unfamiliarity with managing undifferentiated illness, may be less tolerant of uncertainty. A number of practical and teachable strategies have been described for this purpose.[34]

Another strategy to help deal with undifferentiated presentations is to consult evidence summaries and guidelines. The routine use of practical evidence-based guidelines should be strongly supported.

Implications for further research

Particular aspects of registrar management of fatigue demand further analysis, including the associations between test ordering and the effect of educational interventions on management of undifferentiated presentations. The ReCEnT study methodology, as a cohort study, will also allow examination of changes in registrar test order-

ing over the course of training. An appreciation of the reasoning and rationale of registrars' test ordering for fatigue would also be of importance and is a suitable area for qualitative research. This could usefully include the investigation of the contribution of intolerance of uncertainty and the desire to 'reassure the patient' to test ordering behaviour.

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COMPETING INTERESTS
None declared.