

# Investigating tiredness in Australian general practice

## Do pathology tests help in diagnosis?

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**INTRODUCTION** Tiredness is a common presentation in general practice for which pathology tests are commonly ordered. Our aim was to study their utilisation for tiredness.

**METHODS** We examined an integrated database which contains the medical records for 58 139 patients and their 696 518 associated general practitioner encounters. Three hundred and forty-two patients and their 1652 associated encounters were randomly selected out of 12 291 patients and their 26 748 associated encounters that had mentioned tiredness (or a synonym).

**RESULTS** One hundred and eighty-one patients (53%) had at least one pathology test ordered at any time in their episode of care. Patients over 60 years of age, patients who consulted their GP more than once and patients without comorbidity were more likely to have a pathology test ordered. Only 12 patients (3%) had a significant clinical diagnosis based on an abnormal pathology test.

**CONCLUSION** Pathology testing for patients presenting with tiredness is high. Most tests do not yield a significant clinical diagnosis.

Although tiredness is a common symptom among patients in general practice, it is rarely associated with serious disease.<sup>1-3</sup> It is the seventeenth most frequent reason for a patient to consult an Australian general practitioner<sup>4</sup> and the fourth most common problem associated with pathology testing. The rate of ordering increased from 300 test orders per 100 problems in 1998-1999 to 355 in 2001-2002.<sup>4-7</sup> Nevertheless, tiredness does not rank among the GP reported 30 most commonly managed problems in general practice.<sup>4-7</sup> The diagnostic challenge for the GP is to detect physical causes and serious disease without excessive medical investigation.

Tiredness can indicate a number of physical or psychological disorders. Almost

any medical condition can cause tiredness. Psychosocial illnesses are the most common causes.<sup>8-11</sup> About half of consultations with Australian GPs for tiredness result in a pathology test (the most common being a full blood examination).<sup>12</sup> Yet confirmation of diagnosis is rare.<sup>13-15</sup>

There is limited Australian research about the appropriateness of pathology tests for tiredness, or the impact investigations have on patient management. In Britain, 33% of patients with tiredness had one or more abnormal result from a pathology test, but only 9% were clinically important.<sup>13</sup>

We aimed to describe the use of pathology ordering in patients who present to the Australian GP with tiredness.

### Methods

We retrospectively examined case notes audited over seven years (1 April 1994 to 25 April 2001) of patients enrolled in six general practices in South Australia, Western Australia, Victoria and the Australian Capital Territory with computerised medical record systems. Clinical information from participating practices has been consolidated into a computerised database (Medic-GP) of all patient clinical encounters including consultation, pathology investigations, diagnostic imaging and medications prescribed.<sup>16</sup> Anonymity of patient records was preserved because patient names were replaced by record numbers. Patients in the Medic-GP database are representa-

tive of Australian general practice attendees, both by age and sex.<sup>17</sup>

We searched the Medic-GP database for all patient visits using the key terms: tiredness, fatigue, weariness, weakness, lethargy or malaise, and individually checked them. Patients under five years of age were excluded.

Trained data entry staff coded the relevant details (such as patient comorbidities, other symptoms, pathology investigations) using a controlled vocabulary list, to an episode of care (defined as the period surrounding all care from start of the tiredness to its finish, or the end of the relevant care).<sup>18</sup>

Of the 58 139 patients included on the database there were 12 291 patients with the mention of at least one of the specified problems. The prevalence of tiredness was 21% of all patients included on the database. All records mentioning tiredness, fatigue, weariness, weakness, lethargy or malaise were randomly sorted. We aimed to select 300 patients from the database presenting to their GP with tiredness. Previous studies of similar size were able to describe the patient group and find statistically and practically important associations.<sup>13-15</sup> A random number generator was used to select 345 patients and their

1656 associated GP encounters for the case note review but of these, three did not have sex specified in their case notes. As sex is an important factor when considering the management of tiredness these three patients were excluded from all analyses and this paper reports on 342 patients and their 1652 associated GP encounters.

Discrete variables were compared using the Pearson  $\chi^2$  test. We used logistic regression to determine the possible predictors of a patient having a pathology test ordered (age, sex, number of visits and whether there were any comorbidities associated with the patient).

## Results

Two hundred and twenty (64%) were female; the mean age was 44 years (range 6-90 years). The mean number of consultations for all patients with tiredness was 4.8 (SD: 9.8), (range from 1-74 consulta-

tions) and 189 patients (55%) consulting once for tiredness. Female patients consulted the GP significantly more frequently ( $p=0.014$ ) (Table 1). Those over 60 years of age consulted the GP with tiredness significantly more than younger patients ( $p=0.009$ ).

There were 161 (47%) patients who had no pathology ordered at any time; 181 (53%) who had at least one. At least one pathology test was ordered for 125 (57%) females compared to 56 (46%) males ( $p=0.053$ ). Patients 60 years were significantly more likely to have a pathology test ordered ( $p<0.001$ ), and to have their first pathology test on a visit other than their first visit, than those aged 30-59 and 29 years ( $p=0.002$ ).

Most, 121 (67%) patients, had a pathology test ordered in the first visit, 25 (14%) not until a second visit, 8 (4%) at a third visit, and 27 (15%) after that. Sex

**Table 1. Frequency of consultation for tiredness by sex**

Number of visits to the GP	Female	Male	Total
1 visit	109 (49%)	80 (65%)	189 (55%)
2-4 visits	70 (32%)	29 (24%)	99 (29%)
≥5 visits	41 (19%)	13 (11%)	54 (16%)
Total	220 (100%)	122 (100%)	342 (100%)

**Table 2. Association between age, sex, number of visits and comorbidity, of patients with tiredness having a pathology test ordered**

	n	%	Total	*Adjusted odds ratio	95% CI	Unadjusted odds ratio	95% CI	
Sex	Female	220	64	342	1.1	0.7 1.9	1.5	0.9 2.4
	Male	122	36	-	-	-	-	-
Age	≤29 years	92	27	342	-	-	-	-
	30-59 years	163	48	-	2.4	1.3 4.3	2.0	1.1 3.3
	≥60 years	87	25	-	2.8	1.4 5.5	2.9	1.6 5.4
Number of visits	1 visit	189	55	342	7.2	4.2 12.5	5.0	3.1 8.0
	≥2 visits	153	45	-	-	-	-	-
Comorbidities	No	87	25	342	4.0	2.2 2.3	1.7	1.1 2.9
	Yes	255	75	-	-	-	-	-

\* Adjusted for sex, age, number of visits and comorbidities

**Table 3. Type of pathology tests ordered**

Pathology test	n	%	n abnormal pathology resulting in significant clinical diagnosis
Full blood examination	316	26.7%	4
Urea, electrolytes and creatinine	214	18.1%	4
Thyroid function test	139	11.7%	2
Liver function test	129	10.9%	2
Blood glucose test	109	9.2%	2
Erythrocyte sedimentation rate	103	8.7%	0
Iron studies	85	7.2%	2
B <sub>12</sub>	54	4.6%	0
Folate	34	2.9%	0
Total	1183	100%	16

(38, 68% males compared to 83, 66% females) had no significant effect on having a test ordered at the first visit.

Logistic regression for independent predictors showed that patients aged over 60 years of age were 2.8 times more likely to have a pathology test compared to younger patients; those who consulted the GP more than once were 7.2 times more likely to have a pathology test, and those without a comorbidity were 4.0 times more likely to have a pathology test (Table 2).

There were 1183 pathology tests ordered. Most patients had between one and six tests (Table 3).

**Table 4. Number of tests performed per patient that were normal or abnormal by typed test**

Typed test	Number of times tests performed per patient	Number of abnormal tests for each patient					Total n
		0 n	1 n	2 n	3 n	4 n	
Full blood examination	1	217	18	-	-	-	235
	2	8	9	4	-	-	21
	3	1	3	4	1	-	9
	4	-	-	1	2	-	3
Urea, electrolytes, creatinine	1	136	14	-	-	-	150
	2	1	3	11	-	-	15
	3	-	2	2	6	-	10
	4	-	-	-	-	1	1
Thyroid function test*	1	109	6	-	-	-	115
	2	7	-	-	-	-	7
	3	-	-	1	1	-	2
	4	1	-	-	-	-	1
Liver function test	1	97	5	-	-	-	102
	2	2	2	2	-	-	6
	3	1	1	1	2	-	5
Erythrocyte sedimentation rate	1	64	39	-	-	-	103
Iron studies	1	45	9	-	-	-	54
	2	4	3	1	-	-	8
	3	1	-	4	-	-	5
Blood glucose	1	96	7	-	-	-	103
	2	2	1	-	-	-	3
B <sub>12</sub>	1	54	-	-	-	-	54
Folate	1	34	-	-	-	-	34
<b>Total</b>		<b>880</b>	<b>122</b>	<b>31</b>	<b>12</b>	<b>1</b>	<b>1046</b>

\* Note: Eight patients had an abnormal thyroid function test, but only two patients had a new and active diagnosis of thyroid disease. (The other six had a past history of thyroid disease being monitored by the GP)

Of the 1183 pathology tests ordered there were only 1046 corresponding test results recorded. The laboratory records of 137 tests were incomplete, and therefore could not be coded; 880 (84%) tests were normal with only 166 (16%) deemed abnormal (Table 4). Only 12 patients (4% of 342 patients sampled) had a significant clinical diagnosis made because of an abnormal pathology test, two of which were separate diagnoses (renal failure and diabetes mellitus, nephropathy and hepatitis). Overall the diagnoses based on an abnormal pathology test included anaemia (3), diabetes mellitus (2), renal failure (2), glandular fever (1), goiter (1), hepatitis (1), HIV infection (1), hypokalaemia (1), hypothyroidism (1), and nephropathy (1). Of patients who had no pathology ordered, 16 (5%) had a significant clinical diagnosis identified, and 51 (15%) had no clinical diagnosis identified in their episode of care.

## Discussion

Was the sample representative? The GPs were self selected and providing patient medical records for more than 10 years. It seems unlikely that information bias could have influenced the results.

We showed that the majority of patients have a pathology test ordered on the first visit to the GP, although only a small number have a new diagnosis derived from an abnormal pathology test. Those with no pathology ordered were as likely to be given a new diagnosis as those who had pathology ordered.

Our findings confirm previous work elsewhere.<sup>13-15</sup> The three most likely diagnoses seem to be anaemia, diabetes mellitus and hypothyroidism; and the most useful pathology tests are the full blood examination, blood glucose test and the urea, electrolytes and creatinine test. We could identify no Australian guidelines for investigating tiredness in general practice. The Dutch College of General Practitioners recommends postponing

blood tests for patients presenting with vague medical conditions for one month.<sup>19</sup>

More research to elucidate the predictors of patients with important medical problems is required to begin the process of defining appropriate guidelines and decision support tools for the problem of tiredness in Australian general practice.

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## References

1. De Rijik A, Schreurs K G, Bensing J. General practitioners' attributions of fatigue. *Soc Sci Med* 1998; 47:487-496.
2. Murtagh J. Making fatigue less tiresome. *Med J Aust* 1996; 164:580-581.
3. Ridsdale L. Tired all the time. *BMJ* 1991; 303:1490-1491.
4. Britt H, Miller GC, Knox S, et al. General practice activity in Australia 2001-2002. Canberra: Australian Institute of Health and Welfare, 2002.
5. Britt H, Sayer G P, Miller G C, et al. General practice activity in Australia 1998-1999. Canberra: Australian Institute of Health and Welfare, 1999.
6. Britt H, Miller G C, Charles J, et al. General practice activity in Australia 1999-2000. Canberra: Australian Institute of Health and Welfare, 2000.
7. Britt H, Miller G C, Knox S, et al. General practice activity in Australia 2000-2001. Canberra: Australian Institute of Health and Welfare, 2001.
8. David A, Pelosi A, McDonald E, et al. Tired, weak or in need of rest: fatigue among general practice attenders. *BMJ* 1990; 301:1199-1202.
9. Knottnerus J, Knipschild P G, van Wersch J W J, Sijstermanns A H J. Unexplained fatigue and hemoglobin: A primary care study. *Can Fam Physician* 1986; 32:1601-1604.
10. Llewelyn M. Assessing the fatigued patient. *Br J Hosp Med* 1996; 55:125-129.
11. Ridsdale L, Evans A, Jerrett W, Mandalia S, Osler K, Vora H. Patients who consult with tiredness: Frequency of consultation, perceived causes of tiredness and its

association with psychological distress. *Br J Gen Pract* 1994; 44:413-416.

12. Britt H, Miller G C, McGeechan K, Sayer G P. Pathology ordering by general practitioners in Australia 1998. AIHW Cat. No. GEP 4. Canberra: Department of Health and Aged Care, 1999.
13. Ridsdale L, Evans A, Jerrett W, Mandalia S, Osler K, Vora H. Patients with fatigue in general practice: A prospective study. *BMJ* 1993; 307:103-106.
14. Jerrett W. Lethargy in general practice. *The Practitioner* 1981; 225:731-737.
15. Morrison J. Fatigue as a presenting complaint in family practice. *J Fam Pract* 1980; 10:795-801.
16. Beilby J J, Marley J E, Walker D C, Duszynski K M. Medic-GP: An example of an observational, pharmacoepidemiological database. *Pharmacoepidemiol Drug Saf* 2001; 9:534.
17. Beilby J J, Marley J E, Walker D C, Chamberlain N L, Burke M. Effect of changes in antibiotic prescribing on patient outcomes in a community setting: a natural experiment in Australia. *Clin Infect Dis* 2002; 34:55-64.
18. Lamberts H, Hofmans-Okkkes I. Episode of care: A core concept in family practice. *J Fam Pract* 1996; 42:161-167.
19. Dinant G J, van Wijk M A M, Janssens H J E M, et al. NHG-standaard bloedonderzoek. Algemene principes en uitvoering in eigen beheer. (Dutch College of General Practitioners guidelines for blood tests. General principles and testing in own practice.) *Huisarts Wet* 1994; 37:202-211.

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## Implications of this study for general practice

- Most use of pathology is unproductive.
- There are no guidelines about its best approach to investigation in Australian general practice.
- Only 5% of patients with tiredness have a clinical diagnosis derived from an abnormal pathology test.
- The most useful pathology tests are:
  - full blood examination
  - blood glucose test
  - urea, electrolytes and creatinine test.

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