

Research papers

Delay pattern analysis of 406 patients with diabetes or thyroid disease in one general practice over 10 years

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ABSTRACT

Delay pattern analysis is a form of significant event audit. It provides comparative information about the process of diagnosis, a subject seldom covered in audit. Practices should consider investigating the causes of diagnostic delay for those patients with endocrine disease when this is longer than six months. This should normally be a small number

each year. Patients with previous hyperthyroidism should have thyroid function tests every 1–2 years. Most patients (69%) were diagnosed in general practice.

Keywords: audit, delay pattern analysis, diabetes, general practice, thyroid disease

Introduction

One of the most difficult tasks in general practice is making important diagnoses at an early stage in those conditions when there is the prospect of benefit to the patient.^{1,2} ‘Delay pattern analysis’ is the systematic study of the process of making diagnoses,³ and has been extended to a wide variety of conditions. It is a form of significant event audit and can be rewarded under the new General Medical Services (GMS2) contract.⁴

We inevitably reflect upon significant new diagnoses in patients whom we are caring for. We are relieved when this has been done speedily, and concerned when there has been excessive delay. Probably only a few cases are especially memorable and lead to changes in subsequent practice, and other lessons might be missed. Hence ‘Delay pattern analysis’. ‘Delay’, because it is a measurement of the time between the first opportunity to make a diagnosis and it actually *being* considered or made. ‘Pattern’, because a series of patients are being compared. ‘Analysis’, because this is a structured process.

We have previously studied participants in the Fellowship by Assessment scheme of the Royal College of General Practitioners (RCGP), general practitioners (GPs) around the Mersey region, and patients with

gout in this practice.^{5–7} Delay pattern analysis is both useful and interesting and deserves to be better known.

Patients and method

The practice is situated in the former mining village of Haydock, St Helens. The list size remained about 8000 in recent years and patient turnover was low. All new cases of diabetes and thyroid disease in patients of the practice were recorded prospectively since 1993, and in 2000 this was supplemented by reviewing the records of all patients whenever or wherever they were diagnosed.

The key information is the time between presentation of a suspicious symptom and the diagnosis being considered. ‘Consideration’ would be ordering of an appropriate test for endocrine disease, not the receipt of the result. The date of presentation was the first record of a problem later attributed to the condition in question (see Box 1 for illustrative example). Two operating rules help standardise comparisons and maintain realism: a three-year limit on the retrospective search of records; presentation cannot precede negative tests, i.e. false negatives are assumed not to occur.

Diagnostic delays can be very long in time but with scant opportunity for their diagnosis since the patient has not been seen within the practice. To discover whether opportunities had been missed, the number of GP consultations between presentation and diagnosis being considered can also be counted.

Results

Table 1 shows the delay patterns for the different conditions.

Diabetes

One-hundred-and-sixty-two patients (66%) were diagnosed within general practice, usually the study practice but occasionally the one where they were previously registered; 43 (17%) in hospital; and 31 (13%) elsewhere such as occupational health. In 11 (4%) the place of diagnosis was uncertain.

Hypothyroidism

Eighty-three patients (72%) were diagnosed within general practice; 22 (19%) in hospital, often on annual review for previous hyperthyroidism. In ten patients (9%) it was not possible to tell where the diagnosis was made.

Hyperthyroidism

Thirty-seven patients (84%) were diagnosed within general practice; six (14%) in hospital; and for one (2%) the place of diagnosis was uncertain.

Of newly diagnosed patients in 2000–2001, the following proportions (%) were diagnosed on the day of presentation:

- 19/24 (79%) diabetes
- 9/9 (100%) hypothyroidism
- 3/4 (75%) hyperthyroidism

Discussion

What the data show

This standard format for data collection allows some comparisons to be made. For over half of all patients with any condition, the diagnosis was made or considered at presentation. The median delay was therefore nil. There is some evidence that recent diagnoses are being made more quickly. Table 1 shows the time between first presentation and the diagnosis being considered. The 80th and 90th centiles are probably the most useful figures (the time by which 80% or 90% of patients had been diagnosed). This is consistent with the largest study of delay pattern analysis in British general practice.⁸

Fifteen diabetics took longer than a year to be diagnosed. These patients had a mean number of 15 consultations (range 1–62) within general practice between presentation and diagnosis, suggesting that opportunities to make the diagnosis were missed.

The figures for hypothyroidism look more alarming, but 10 of the 15 patients where the diagnosis took longer than two years to be made were diagnosed before 1990, when diagnostic tests were performed less frequently and occult hypothyroidism was, perhaps, less often considered. Conversely in 2000–2001, all

Table 1 Delay patterns for different conditions

	Diabetes	Hypothyroidism	Hyperthyroidism
Total patients	247	115	44
Number (%) of patients where the time to diagnosis could be calculated	152 (62)	68 (59)	32 (73)
Percentage of patients where diagnosis was suspected on the day of presentation	64	51	66
Time to diagnosis (months)			
80th centile	3	27	2
90th centile	12	50	3
95th centile	25	75	6

Box 1 Initial symptoms of hypothyroidism used in collaborative study⁶

A list of possible presentations based upon standard medical textbooks:

Tiredness, general malaise, anorexia	Weight gain
Cold intolerance	Hoarseness
Goitre	Bradycardia
Cardiac failure	Xanthelasma
Carpal tunnel syndrome	Macrocytosis (97 fl or more)
Dry skin/vitiligo/puffy eyes/hair loss or dry hair	Infertility
Menorrhagia/oligomenorrhoea	Constipation
Poor memory/depression/psychosis	

new patients had the diagnosis suspected at presentation, and thus there was no diagnostic delay. It appears that diagnoses were generally made quickly in the last year of the study.

For delay pattern analysis to be systematic there must be a list of possible presentations to be referred to (see Box 1 for list for hypothyroidism). Many are common symptoms, such as tiredness, with most patients not having the disease in question. It is worth noting that 16 (14%) of the patients who went on to develop hypothyroidism had previous hyperthyroidism, and it would seem essential that practices have systems to check thyroid function tests every 1–2 years in these patients who may otherwise be overlooked.

The distribution of diagnostic delays is skewed as Table 1 shows, with a long tail. It would therefore seem better to investigate why the diagnosis is sometimes very delayed, rather than studying the majority in whom it is made speedily. A typical group practice would therefore have a small number, perhaps 1–3 patients each year, when the diagnosis is delayed more than, say, six months. An annual review of these patients should be both manageable and instructive, and could contribute to the GMS2 organisational indicators.⁴ Furthermore, many patients are started on thyroxine with only minor abnormalities in their thyroid function tests (TFTs). The minority of patients with very abnormal TFTs are thus most worth reviewing.

The overall prevalence of the endocrine conditions in the practice is greater than other published figures (Table 2). This is further evidence that diagnoses are not being missed, and is a useful source of supplementary data.

Table 2 Comparison of the Haydock figures with those of the UK

Prevalence	Haydock	UK figures ⁹
Diabetes	35/1000	25/1000
Hypothyroidism	31/1000	18/1000

Problems with delay pattern analysis data

Consistently short intervals may represent over-investigation and over-referral. Poor note-keeping may paradoxically appear as good practice since there may be no record of earlier symptoms that could have been overlooked.

Comparison with other work

Since Hodgkin's initial work on diagnosis in general practice was published in 1963 his classic study has been republished many times and remains the standard text on the subject.² Other papers appear from time to time, often from secondary care and usually retrospective. The components of delay pattern analysis can be split: first presentation and referral for further investigation or treatment; referral and first appointment; first appointment and treatment. This is appropriate when referral to secondary care is usual, and a study in Devon did this for six common cancers, showing a large range of intervals.⁸ We chose the time to *consideration* of the diagnosis in this study since investigation by blood sugar or thyroid function tests is readily available, and delays before the results are received and acted upon should be minimal.

A survey in seven Southampton practices in 1984 showed that 73% of diabetics had been diagnosed in general practice.¹⁰ In our study of delay pattern analysis in local practice 77% of patients with diabetes and 92% of those with hypothyroidism were diagnosed in general practice.⁶ The figures from different series are broadly similar,^{5,7} and precise comparisons are difficult when much depends upon how observers record data.³

Use of this form of audit

The comparisons of delay pattern analysis are principally useful for educational purposes. They cannot be used to differentiate between 'good' and 'bad' practice since it is difficult to apply strict standards to them.

Their value is educational in considering how well a group of patients with a certain condition were detected and subsequently managed.³ This can lead on to a discussion about strategies for managing presenting problems, such as weight loss. Data collection over a long time allows monitoring of clinical performance.

Delay pattern analysis is then best understood as a variety of significant event audit.¹¹ Tudor Hart, in a retrospective view of his practice over 21 years, concluded 'most errors made by the GP were the result of poor organisation and follow up and failure to apply consistent criteria for diagnosis and treatment'.¹² Therefore external agencies, such as assessors for the Fellowship by Assessment Scheme¹³ which specifically requires candidates to review delay pattern analyses (see Box 2) can ask what changes the audit has brought about, and encourage the continued collection and periodic discussion of data, as we did for over a decade.

Delay pattern analysis provides comparative data upon the process of diagnosis within practices, an important activity that still receives little attention in published audits. It is of educational value and whether longer term use of the technique improves performance would be almost impossible to prove. Furthermore, widespread introduction of delay pattern analysis is likely to require facilitation, which is expensive. Meanwhile, professionals within primary care must state what audit they want to do if they are not to find worthless tasks imposed upon them. Delay pattern analysis is a potentially attractive component of any set of audits, and the demonstration that it can be useful should lead on to wider investigation of its role.

Box 2 RCGP, Fellowship by Assessment¹³

The candidate must demonstrate a commitment to the principle of early diagnosis by retrospectively surveying the care of samples of patients seen by him/her. The surveys must refer to the interval between the first presentation of a relevant symptom and appropriate action by the doctor for 10 patients with malignant conditions and 10 with non-malignant conditions. The candidate must reflect on how the cases have influenced his/her personal practice.

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CONFLICTS OF INTEREST

None.

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