General practitioners' ranking of evidence-based prescribing quality indicators: a comparative study with a prescription database

Ifeanyi Okechukwu, Kathleen Bennett & John Feely

Department of Pharmacology and Therapeutics, Trinity Centre for Health Sciences, St James's Hospital, Dublin, Ireland

Correspondence

Ifeanyi Okechukwu, Department of Pharmacology and Therapeutics, Trinity Centre for Health Sciences, St James's Hospital, Dublin 8, Ireland.
Tel.: + 353 1608 1408
Fax: + 353 1453 9033
E-mail: okechuki@tcd.ie.

Keywords

general practice, prescribing, quality indicators

Received

7 September 2005

Accepted

10 January 2006

Published OnlineEarly

18 April 2006

Background

To ensure that indicators for assessing prescribing quality are appropriate and relevant, physicians should be involved in their development. How general practitioners (GPs) rank these indicators is not fully understood.

Aims

(i) To determine how GPs in Ireland rank a set of evidence-based prescribing quality indicators in order of importance and relevance to their practice, and (ii) to compare the GPs' ranking of the defined set of indicators with actual prescribing practice using a prescription database.

Methods

A postal questionnaire was sent to 105 GPs, who were asked to rank a set of 11 prescribing quality indicators, identified from the literature from most to least important. The results were aggregated and a weighted score for each indicator determined. These same prescribing indicators were then applied to a prescription database to compare the ranking provided with actual prescribing practice.

Results

Eighty-six GPs (82%) returned the completed questionnaire. The higher ranks were for quality issues—use of inhaled corticosteroids, statins and benzodiazepines. Actual prescribing data showed prolonged use of benzodiazepines in over half of the prescriptions dispensed ($n = 18\,171$), 52.48% (95% confidence interval 51.95, 53.01) and low usage of generic drugs, 17.78% (17.70, 17.90) despite their high ranking by the GPs.

Conclusion

While GPs have diverse views about the value of different prescribing quality indicators, the results suggest that they do rank evidence-based guidelines on patient management highly, but those based on costs and less evidence the lowest. There was considerable divergence between theory and practice in the application of quality indices.

Introduction

Prescribing is an integral part of general practitioners' (GPs) therapeutic activities. With the majority of doctor–patient encounters in general practice resulting in a

prescription for drug treatment, the quality of prescribing in general practice is an important issue [1]. Good indicators are needed for a valid and reliable measurement of the quality of prescribing in general practice and

different indicators have been developed [2]. A prescribing quality indicator has been defined as 'a measurable element of prescribing performance for which there is evidence or consensus that it can be used to assess quality, and hence in changing the quality of care provided' [3]. One of the common uses of prescribing indicators is to assess the performance of doctors. Ideally, indicators for assessing prescribing quality should be developed with the close involvement of the GPs for whom they are intended, helping to ensure that they are credible and their outcomes acceptable [4]. Indicators are not always easily transferable from one country to another because of variations in practice cultures and specific patient needs [5]. In addition, few studies have shown how GPs rank these indicators as being relevant to their practice.

The aims of this study were to (i) determine how GPs in Ireland rank a set of prescribing quality indicators in order of importance and relevance to their practice, and (ii) to compare the GPs' ranking of the defined set of evidence-based prescribing indicators with actual prescribing practice using a prescription database.

Methods

Survey on GPs' ranking of prescribing indicators

A postal survey was sent in January 2005 to 105 GPs working in the Eastern region of Ireland. The mean age of the GPs was 50 years, 83.5% were males, with mean list size of 913 patients. The GPs were already involved in a project evaluating rational prescribing and were invited to participate in the survey. The 105 GPs were self-selected from a large group of 302 GPs in the Eastern region with a list size of more than 500 patients. They were younger (mean age 50 years) compared with nonparticipants (mean age 54 years), but there was no difference in their prescribing patterns.

Eleven prescribing quality indicators based on various aspects of quality (cost, safety, optimum prescribing in clinical conditions) were identified from the literature [6–18]. All indicators were presented as good indicators, e.g. a high rate of generic prescribing, a low rate of prescribing of oral nutritional supplements, etc. The GPs were asked to rank these 11 indicators in order of importance and relevance to their prescribing practice, with a rank of 1 to 11, 1 being the most important and 11 the least. The results were aggregated and a weighted score for each indicator determined based on the frequency of responses; the highest ranked item was that with the largest score, and so on. The GPs were also asked to identify any additional indicators which they thought were important but were not included in the list.

Quality indicators in practice

The Health Service Executive's Primary Care Reimbursement Services [HSE-PCRS, formerly the General Medical Services (Payments) Board] prescription database in Ireland was used to assess the performance of GPs with respect to the indicators. The HSE-PCRS scheme is a means-tested scheme providing free medical care for all those eligible and covers approximately 31% of the total population (approximately 1.2 million). Prescriptions are dispensed through community pharmacies operating within the scheme and a computer system processes pharmacists' claims which, in addition to providing details on prescription items, also contain [unlike Prescription Analysis and Cost (PACT) data] demographic data on patients, such as age and sex. No information on diagnosis is recorded. All prescription items are coded according to the World Health Organization (WHO) Anatomical Therapeutic Chemical (ATC) classification system [19].

Ireland is divided into eight regions for administration of health services, with the Eastern Regional Health Authority (ERHA) [also known as the HSE Eastern Region] being the largest region and including the capital Dublin. These indicators were applied to the prescription database of the ERHA for January 2005 [and February 2005 for prolonged prescribing of benzodiazepines and proton pump inhibitors (PPIs)], to compare the ranking provided by the GPs with actual prescribing practice. This period was chosen as it coincided with the time when the GPs were surveyed. All data from all GPs in the Eastern region, not just the surveyed GPs, were included.

As a measure of prescribing rates for benzodiazepines and PPIs, we used defined daily doses (DDD), the average daily adult recommended dose. Inhaled selective β_2 -adrenoceptor agonists (ATC code R03AC) and inhaled glucocorticoids (ATC code R03BA) dispensed to patients aged 16–44 were identified from the database and used as indicator or proxy for asthmatic patients [20]. The age limit was set in order to exclude children where the guideline recommendations [8] deviate from those established for adults and also to reduce the number of older people included with chronic obstructive pulmonary disease [20]. Patients with presumed heart failure were identified as those having received prescriptions for recommended drug treatment for heart failure [ACE inhibitors (ATC code C09) and loop diuretics (ATC code C03C) with either bisoprolol (ATC code C07AB07) or carvedilol (ATC code C07AG02)] within the same month [9]. Bisoprolol and carvedilol are the only β -adrenergic receptor blocking agents licensed for use in heart failure in Ireland. Prescription of oral

hypoglycaemic drugs (ATC code A10B) was used as proxy for non-insulin-dependent diabetes mellitus (NIDDM). Prescription of digoxin was used as a proxy for atrial fibrillation [21]. All analysis was carried out using the SAS statistical software package version 9.1 (SAS Institute Inc., Cary, NC, USA).

Results

GP survey

Completed questionnaires were received from 86 GPs of 105 surveyed, giving a response rate of 82%. The results of the survey are illustrated in Table 1.

The highest ranked indicator was for 'a high ratio of prescribing of inhaled corticosteroids to inhaled bronchodilators in patients with moderate to severe asthma' followed by 'a high rate of prescribing of statins and aspirin in patients with non-insulin dependent diabetes mellitus (NIDDM)'; the doses of PPIs, use of oral nutritional supplements and a low rate of prescribing of compound analgesic relative to paracetamol were ranked least important by the GPs. Other indicators suggested by few GPs included 'a low rate of long-term hormone replacement therapy prescription' and 'a low rate of prescribing of carbocysteines and thyroxine'. However, the prescribing rates of these suggested indicators were very low and therefore were not considered further.

Application of prescribing indicators to prescription database

A total of 889 754 prescription items for 182 175 patients (male:female 69 989 : 112 186) were identified using prescribing data from the ERHA for January 2005. The results are summarized in Table 2. It is clear that some of the indicators, including the highly ranked inhaled corticosteroids to bronchodilator ratio and use of paracetamol compared with nonsteroidal anti-inflammatory drugs (NSAIDs) in heart failure, are uncommonly encountered.

Discussion

The results suggest that the GPs rank indicators on optimum prescribing in clinical conditions and evidence-based guidelines on patient management highly (a high ratio of prescribing of inhaled corticosteroids to inhaled bronchodilator, ranked first; followed by a high rate of prescribing of statins and aspirin in patients with NIDDM), but those based on cost and less evidence lowest (a low rate of prescribing of oral nutritional supplements and a low rate of prescribing of compound analgesics relative to paracetamol). In a related study that assessed the face validity of both simple and advanced quality indicators of prescribing in general practice in Denmark, Rasmussen *et al.* found that GPs

Table 1

Weighted scores and ranking of the prescribing quality indicators from the GP survey (in the order that they were ranked by the GPs)

Prescribing quality indicator	Weighted score	Rank
A high ratio of prescribing of inhaled corticosteroid to inhaled bronchodilators in patients with moderate to severe asthma	752	1st
A high rate of prescribing of statins and aspirin in patients with NIDDM (as recommended by ICGP and National Guidelines)	686.5	2nd
A low rate of benzodiazepine prescribing for prolonged periods (>2–4 weeks)	661.5	3rd
A high rate of generic prescribing (a high rate is considered to be a marker of cost consciousness)	624.5	4th
A high rate of prescribing of paracetamol compared with NSAIDs in patients with concomitant heart failure (NSAIDs may antagonize the effect of therapy for heart failure)	558	5th
A low rate of coprescription of potassium supplements or potassium sparing diuretics for patients receiving ACE inhibitors or angiotensin antagonists (risk of hyperkalaemia)	554	6th
A high rate of prescribing of thromboembolic prophylaxis in patients over 75 years on digoxin (a marker for atrial fibrillation)	520.5	7th
A low rate of prescribing of broad spectrum antibiotics such as coamoxyclav (augmentin®) compared with oral amoxicillin or penicillin for first-line treatment	467.5	8th
A low rate of prescribing of proton pump inhibitors, e.g. omeprazole, lansoprazole, at full curative dose for >4 weeks rather than a maintenance dose	351.5	9th
A low rate of prescribing of oral nutritional supplements	291.5	10th
A low rate of prescribing of compound analgesics such as distalgesic or coproxamol relative to paracetamol	215.5	11th

NIDDM, Non-insulin-dependent diabetes mellitus; ICGP, Irish College of General Practitioners; NSAID, nonsteroidal anti-inflammatory drug.

Table 2

Prescription rates (95% CIs) of prescribing quality indicators applied to Eastern Regional Health Authority (ERHA) prescription database

Prescribing quality indicator	Prescribing rate in database (95% CI)
A high ratio of prescribing of inhaled corticosteroid to inhaled bronchodilators in patients with moderate to severe asthma	1.57 : 1
A rate of prescribing statins and aspirin in patients with NIDDM (<i>n</i> = 8093)	
Aspirin	64.70% (63.66, 65.74)
Statins	59.14% (58.07, 60.21)
Aspirin + statins	44.23% (43.15, 45.31)
A low rate of benzodiazepine prescribing for prolonged periods (>4 weeks) (<i>n</i> = 18 171)	52.48% (51.95, 53.01)
A high rate of generic prescribing (<i>n</i> = 158 128)	17.78% (17.70, 17.90)
A high rate of prescribing of paracetamol compared with NSAIDs in patients with concomitant heart failure (<i>n</i> = 1396).	1 : 1.49
Paracetamol	8.24% (6.80, 9.68)
Nonsteroidal anti-inflammatory drugs	12.25% (10.53, 13.97)
A low rate of coprescription of potassium supplements or potassium sparing diuretics for patients receiving ACE inhibitors or angiotensin antagonists (<i>n</i> = 37 074)	2.32% (2.17, 2.47)
Potassium supplements (<i>n</i> = 196)	0.53% (0.46, 0.60)
Potassium sparing diuretics (<i>n</i> = 679)	1.83% (1.69, 1.97)
A high rate of prescribing thromboembolic prophylaxis in patients over 75 years on digoxin (<i>n</i> = 4380)	75.78% (74.51, 77.05)
A low rate of prescribing broad spectrum antibiotics such as coamoxyclav items as percentage of total antibiotics (<i>n</i> = 16 742).	38.73% (38.27, 39.19)
Quinolone items	5.84% (5.62, 6.06)
Co-amoxyclav items	32.89% (32.45, 33.33)
A low rate of prescribing proton pump inhibitors at full curative dose for > 4 weeks rather than a maintenance dose (<i>n</i> = 21 935)	52.92% (52.44, 53.40)
A low rate of prescribing of oral nutritional supplements	
All ages (<i>n</i> = 182 175)	3.39% (3.31, 3.47)
Over 65s (<i>n</i> = 90 869)	6.76% (6.60, 6.92)
A low rate of prescribing compound analgesics relative to paracetamol	1.56 : 1

NIDDM, Non-insulin-dependent diabetes mellitus; NSAID, nonsteroidal anti-inflammatory drug.

prefer indicators on patient level data. In contrast, indicators focusing on the frequency of drug prescribing or costs were not considered to have face value whether based on data at patient or practice level [22].

Comparing GPs' ranking of the evidence-based prescribing quality indicators with actual prescribing practice, the highest ranked indicator (a high ratio of prescribing of inhaled corticosteroids to inhaled bronchodilators in patients with moderate to severe asthma) was applied well using data from the database (ratio 1.57 : 1). This is good practice and in line with the guideline recommendations that inhaled corticosteroids should be considered for patients using inhaled selective β_2 -adrenoceptor agonists three times a week or more, and as a prophylactic medication in those with persistent asthma [8].

The prescribing rates in practice for the second highest ranked indicator (a high rate of prescribing of statins

and aspirin in patients with NIDDM) were 59% and 65% for statins and aspirin, respectively. This showed an increased rate of prescribing of statins when compared with the result from previous studies on the use of statins in Ireland [23]. However, these rates are lower than desired, bearing in mind the clinical evidence of the benefits of statins and aspirin therapy among high-risk groups [6, 12, 16]. According to current guidelines [6, 12], patients with Type 2 diabetes, cerebrovascular disease and peripheral artery disease merit the same degree of attention to treatment of plasma lipids as patients with coronary artery disease, and all such at-risk populations should be eligible to receive statins unless contraindicated. In addition, a meta-analysis conducted by the Antiplatelet Trialists' Collaboration has demonstrated that aspirin reduced the risk of ischaemic vascular events as a secondary prevention strategy in numerous high-risk groups, including

patients with diabetes [24]. A low rate of benzodiazepine prescribing ranked third by the GPs was at variance with actual prescribing practice, where over 50% of the prescriptions for benzodiazepines were for more than 4 weeks, especially in the elderly where the risks of adverse events are higher. Long-term use of benzodiazepines has been associated with a number adverse outcomes, including cognitive impairment, increased risk of falls and hip fracture, motor vehicle accidents and increased risk of developing tolerance and dependence [13, 25]. Furthermore, the GPs agree on generic prescribing as an indicator relevant to their practice (ranked fourth), but the results showed that only 17.78% of the prescription items were generics products (pure generics 3.46% and branded generics 14.32%). Compared with the rates in other European countries such as Denmark (60%) [26] and the UK (70%) [27], Ireland has very low rates of generic prescribing, with the obvious implication of high cost of medicines [28]. GPs need to recognize the benefits of generics prescribing and consider them at the point of prescribing. There may be a need to introduce explicit incentives to encourage doctors to prescribe generically and also for the pharmacists to dispense generically [29]. The use of NSAIDs relative to paracetamol in patients with concomitant heart failure calls for more caution. The results suggested high use of NSAIDs in practice. NSAIDs interact with therapies for heart failure and also worsen the disease condition. With the recent safety issues regarding cardiovascular risks of coxibs, the use of safer alternatives is recommended [13, 30]. Despite being ranked seventh by the GPs, the database showed that the rate of prescribing of thromboembolic prophylaxis in patients over 75 years on digoxin (a marker of atrial fibrillation) in the database was high (76%). This indicates that in practice the GPs do follow guidelines [10] on the benefits of prophylaxis but perhaps examining the ratio of aspirin to warfarin use may further improve the use of this indicator.

The combined rate of prescribing of quinolone items and coamoxyclav items as a percentage of total antibiotics was relatively high. Although our database lacked information on the indications for which these antibacterial agents were prescribed, there is need for caution on the use of these agents based on the increasing reports of antimicrobial resistance [31]. The rate of prescribing PPIs at full curative doses for more than 4 weeks rather a maintenance dose (the ninth ranked indicator) was also high in practice. The use at maintenance dose will lead to a potential cost-saving. Maintenance therapy with PPIs is indicated for a number of conditions, including duodenal ulceration, NSAID-

induced ulceration and gastro-oesophageal reflux disease (GORD). Guidance for the use of PPIs in the treatment of dyspepsia was issued following a review by the UK's National Institute for Clinical Excellence (NICE) in July 2000 [11]. This guidance indicates that patients with severe GORD should be treated with a healing dose of a PPI until symptoms have been controlled. Once this has been achieved the dose should be reduced to the lowest dose that controls symptoms. A regular maintenance low dose of most PPIs will prevent GORD symptoms in 70–80% of patients.

While the overall rate of prescribing of oral nutritional supplements was fairly low, it was high in the elderly. However, considering the fact that the clinical nutritional supplements are amongst the top two highest costing items in primary care in Ireland [32] over the years (second only to statins), there is need to evaluate their use further, in terms of appropriateness, and to develop guidelines for their use in the community [33]. The results from the prescribing database also found that for the least ranked indicator (a low rate of prescribing of compound analgesics relative to paracetamol), the compound analgesics were the most commonly prescribed (ratio 1.56 : 1). A UK survey reported paracetamol-containing combination analgesics accounted for 73% of all prescriptions for paracetamol-containing medicine [34]. In light of current concerns about the risks and benefits associated with the use of compound analgesics and their safety in overdose [35], other analgesics are recommended.

There are certain limitations to our study, which include the bias with GPs' study of similar characteristics [36]. Our prescription database does not contain information on patient diagnosis, the level of severity of the disease or on other potential risk factors such as comorbid illness, etc. However, the database comprises large numbers of patients and use of such a database may be said to reflect real-life usage of medicines and the indices ranked by the prescribers were in the context of the database. In addition, the database suggests that some of the indices relate to infrequent prescribing decisions, but, for those encountered in everyday practice, generic prescribing, prolonged use of benzodiazepines, doses of PPIs and the use of broad spectrum antimicrobial agents may represent areas with considerable potential for improvement.

Conclusion

GPs have diverse views about the value and relevance of different prescribing indicators to their practice. Our results suggest that GPs do rank indicators based on evidence-based guidelines on patient management

highly, but those based on economics and less evidence lowest.

Conflict of interest

None to declare.

We thank the GPs who participated in the survey, Ms Corina Naughton for helping to provide the GPs for the study, the HSE-PCRS for providing the data on which the study is based and the Health Research Board of Ireland for funding.

References

- Pont LG, Denig P, van der Molen T, van der Veen WJ, Haaijer-Ruskamp FM. Validity of performance indicators for assessing prescribing quality: the case of asthma. *Eur J Clin Pharmacol* 2004; 59: 833–40.
- Hoven JL, Haaijer-Ruskamp FM, Vander Stichele RH. DURQUIM Scientific Indicators of prescribing quality in drug utilization research: report of a European meeting (DURQUIM, 13–15 May 2004). *Eur J Clin Pharmacol* 2005; 60: 831–4.
- Lawrence M, Olesen F. Indicators of quality in healthcare. *Eur J General Pract* 1997; 3: 103–8.
- Avery J. Appropriate prescribing in general practice: development of the indicators. *Quality Healthcare* 1998; 7: 123.
- Morris CJ, Cantrill JA, Hepler CD, Noyce PR. Preventing drug-related morbidity—determining valid indicators. *Int J Qual Health Care* 2002; 14: 183–98.
- De Backer G, Ambrosioni E, Borch-Johnsen K, Brotons C, Cifkova R, Dallongeville J, Ebrahim S, Faergeman O, Graham I, Mancia G, Cats VM, Orth-Gomer K, Perk J, Pyorala K, Rodicio JL, Sans S, Sansoy V, Sechtem U, Silber S, Thomsen T, Wood D. European guidelines on cardiovascular disease prevention in clinical practice. Third Joint Task Force of European and other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of eight societies and by invited experts). *Eur Heart J* 2003; 24: 1601–10.
- Williams MA, Fleg JL, Ades PA, Chaitman BR, Miller NH, Mohindinn SM, Ockene IS, Taylor CB, Wenger NK. Secondary prevention of coronary heart disease in the elderly (with emphasis on patients > or = 75 years of age): An American Heart Association Scientific Statement from the Council on Clinical Cardiology Subcommittee on Exercise, Cardiac Rehabilitation and Prevention. *Circulation* 2002; 105: 1735–43.
- The BTS/SIGN British Guideline on the Management of Asthma. *Thorax* 2003; 58 (Suppl. 1).
- Remme WJ, Swedberg K. Guidelines for the diagnosis and treatment of chronic heart failure. *Eur Heart J* 2001; 22: 1527–60.
- Fuster V, Ryden LE, Asinger RW, Cannom DS, Crijns HJ, Frye RL, Halperin JL, Kay GN, Klein WW, Levy S, McNamara RL, Prystowsky EN, Wann JS, Wyse DG, Gibbons RJ, Antman EM, Alpert JS, Faxon DP, Fuster V, Gregoratos G, Hiratzka LF, Jacobs AK, Russell RO, Smith SC, Klein WW, Alonso-Garcia A, Blomstrom-Lundqvist C, De Backer G, Flather M, Hradec J, Oto A, Parkhomenko A, Silber S, Torbicki A. American College of Cardiology/American Heart Association/European Society of Cardiology Board. ACC/AHA/ESC guidelines for the management of patients with atrial fibrillation: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines and Policy Conferences (Committee to Develop Guidelines for the Management of Patients With Atrial Fibrillation): developed in collaboration with the North American Society of Pacing and Electrophysiology. *J Am Coll Cardiol* 2001; 38: 1231–66.
- Guidelines on the Use Proton Pump Inhibitors in the Treatment of Dyspepsia. Technology Appraisal Guidance No. 7. London: National Institute for Clinical Excellence (NICE). <http://www.nice.org.ukJuly> 2000.
- Clinical Guidelines on the Management of Type 2 Diabetes—Management of Blood Pressure and Blood Lipids. Guideline H. London: National Institute for Clinical Excellence (NICE). <http://www.nice.org.ukOctober> 2002.
- British National Formulary (BNF), Number 48. Oxford: Pharmaceutical Press 2004.
- Page J, Henry D. Consumption of NSAIDs and the development of congestive heart failure in elderly patients. *Arch Intern Med* 2000; 160: 777–84.
- Fick DM, Cooper JW, Wade WE, Waller JL, Maclean JR, Beers MH. Updating the Beers criteria for potentially inappropriate medication use in older adults. *Arch Intern Med* 2003; 163: 2716–24.
- MRC/BHF. Heart protection study of cholesterol lowering with simvastatin in 20,536 high-risk individuals: a randomised placebo–control trial. *Lancet* 2002; 360: 7–22.
- Gall MJ, Harner JE, Wanstall HJ. Prescribing of oral nutritional supplements in Primary Care: can guidelines supported by education improve prescribing practice? *Clin Nutrition* 2001; 20: 511–5.
- National Prescribing Centre. The use of oral analgesics in primary care. *Merec Bull* 2000; 11: 1–4.
- WHO. Collaborating Centre for Drug Statistics Methodology (ATC Index with DDDs). Oslo, Norway: World Health Organization 2004.
- Lagerlof P, Veninga CC, Muskova M, Hummers-Pradier E, Lundborg CS, Andrew M, Haaijer-Ruskamp FM. Asthma management in five European countries: doctors' knowledge, attitudes and prescribing behaviour. Drug Education Project (DEP) Group. *Eur Respir J* 2000; 15: 25–9.
- White S, Feely J, O'Neill D. Community-based study of atrial fibrillation and stroke prevention. *Ir Med J* 2004; 97: 10–2.
- Rasmussen HM, Sondergaard J, Kampmann JP, Andersen M. General practitioners prefer prescribing indicators based on detailed information on individual patients: a Delphi study. *Eur J Clin Pharmacol* 2005; 61: 237–41.
- Teeling M, Bennett K, Feely J. The influence of guidelines on the

- use of statins: analysis of prescribing trends 1998–2002. *Br J Clin Pharmacol* 2004; 59: 227–32.
- 24 Antithrombotic Trialists' Collaboration. Collaboration meta-analysis of randomised trials of antiplatelet therapy for prevention of death, myocardial infarction, and stroke in high risk patients. *BMJ* 2002; 324: 71–86.
- 25 Anonymous. Benzodiazepines: Good Practices and Guidelines for Clinicians. Department of Health and Children, Ireland. <http://www.dohc.ie> July 2002.
- 26 King DR, Kanavos P. Encouraging the use of generic medicines: implications for transition economies. *Croat Med J* 2002; 43: 462–9.
- 27 Walley T, Burrill P. Generic prescribing: time to regulate the market? *BMJ* 2000; 320: 131–2.
- 28 Tilson L, McGowan B, Bennett K, Barry M. The high cost of medicines in Ireland. Is it time to change the pricing mechanism? *Eur J Health Econ* 2004; 5: 341–4.
- 29 Bouvenot G, Villani P, Bouvenot J. Generic drugs in the medical-economic context of drug prescriptions. *Presse Med* 2002; 31: 1109–14.
- 30 Anonymous. Non Steroidal Anti-Inflammatory Drugs. Irish Medicines Board Statement. <http://www.imb.ie> 10 June 2005.
- 31 Bruinsma N. Trends in antimicrobial resistance in Europe: report from EARSS. *Eurosurveillance Weekly* 2004; 8: 51.
- 32 General Medical Services (Payments) Board, Annual Report 2004.
- 33 Anonymous. The Role of Oral Nutritional Supplements in Primary Care. National Medicines Information Centre Bulletin 2004; 10: 1–4. <http://www.nmic.ie>
- 34 Haigh S. 12 years on: co-proxamol revisited. *Lancet* 1996; 347: 1840–1.
- 35 Lawrence A. Letter to interested organizations and individuals: Review of the utility of the pain reliever co-proxamol (co-proxamol; cosalgescic; dolsagesic) and request for evidence on risks and benefits. MRHA. <http://www.mhra.gov.uk> 30 June 2004.
- 36 McAvoy BR, Kaner EFS. General practice postal surveys: a questionnaire too far? *BMJ* 1996; 313 (7059): 732–3.