An Analysis of the Top Ten Most Commonly Prescribed Chemical Entities in QRESEARCH

An analysis using QRESEARCH for the Department of Health

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Report reference number	DH 7
Report version number	2.0
Final submission date	April 2004
QRESEARCH Database version	QRESEARCH Pilot (43 practices)
Funding body	Department of Health
Web link	http://www.qresearch.org
Acknowledgments	QRESEARCH is a not-for-profit partnership between the University of Nottingham and EMIS. We acknowledge the contribution of EMIS and to the practices which contribute data

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1 EXECUTIVE SUMMARY

This report uses the Pilot QRESEARCH (43 practices) dataset to report on the top chemical entities prescribed in 2002, with a comparison with the PACT data for the same year.

The top ten chemical entities were the same; the order of two was reversed, but their prescribing rate was similar in both datasets. Unexpectedly the prescribing rates in QRESEARCH were only marginally higher than in the Prescribing Cost Analysis suggesting that uncashed prescriptions may not be as significant a problem as believed.

The rankings for the top 100 chemical entities from the two sources shows substantial variation, but 84% of the top 100 items in PACT also appear in the QRESEARCH top 100.

We looked in detail at antibiotic prescribing. This shows lower rates of prescribing in the QRESEARCH dataset. This may be due to differences in the characteristics of the QRESEARCH practices – they are more likely to be training/teaching practices and less likely to be single-handed compared to the profile of English practices.

2 SPECIFICATION

The following was the specification for this work agreed with the Statistics Division of the Department of Health:

> "We propose, as a simple check of consistency of data, to look at the top 10 chemical entities, prescribed in the community in England in 2002 using Q-Research, GPRD and PACT.
>
> Q-Research and GPRD contain records of a sample of items prescribed in the community in England, while PACT (Prescribing and Cost Analysis Tool, from the Prescription Pricing Authority) contains a record of all NHS prescriptions prescribed in the community in England and dispensed in the UK.
>
> From Q-Research we would need:
>
> - The top ten chemical entities prescribed in England in 2002 to all patients, excluding private prescriptions.
> - The number of prescription items for each of the ten chemical entities and the total number of items prescribed for all chemical entities.
> - 95% confidence intervals around the figures given.
>
> We anticipate possible issues around the recording of chemical entities for combination drugs, especially contraceptives, and possibly variations caused by the difference between the number of prescriptions prescribed (as recorded in Q-Research and GPRD) and the number prescribed that are also dispensed (as recorded in PACT)."

3 OBJECTIVES

Objective 1 To determine the top 100 prescribed chemical entities in QRESEARCH in 2002.

Objective 2 to determine prescribing rates per 1,000 patient for each chemical entity: the number of items prescribed, the prescribing rate and 95% confidence intervals.

Objective 3 To compare the QRESEARCH results with those from PACT in 2002.

4 METHODS

4.1 The databases used

The QRESEARCH database used is the pilot dataset with records from 43 practices. This was downloaded on 23 October 2003.

The source for our comparative data is the Prescription Analysis and Cost (PACT) data from the Prescription Pricing Authority for GP practices in England in 2002, supplied on 16 April 2004.

4.2 Definition of chemical entities and constituents

In EMIS, there is a separate ID for each individual preparation – i.e. item which can be prescribed. There are a series of look-ups that allow you to determine information about each individual prescription item, including the number and type of 'constituents' that it contains.

For example, co-codamol contains both paracetamol and codeine, we would consider it to have two constituents. However, co-codamol itself [and other brand combinations of paracetamol and codeine] would be considered as a single 'chemical entity' made up of two constituents. These chemical entities are then equivalent to the chemical entities listed in the Prescription Cost Analysis for England, 2002.

For this analysis, we grouped each individual preparation according to their constituents. We also included counts for entities not listed in the PACT data. These are mainly items from pseudo chapters 19 to 23 of the BNF.

In PACT, the section on totals for chemicals contains a listing of prescription items prescribed by general practices and dispensed in the community for each chemical entity.

4.3 Inclusion criteria

Our inclusion criteria were that (a) patients must be registered in the practice at some time during 2002 and (b) the practice must be using EMIS for the whole of 2002. All practice met this criterion.

4.4 Numerators for rates

The numerator for prescribing rates is the number of prescription items for each chemical entity issued in the analysis year. Private prescriptions were excluded.

4.5 Denominators for rates

The denominator for the rates is the patient years at risk for registered population. This is the sum of the number of days each patient was registered with a QRESEARCH practice, divided by the number of days (365.25) in the year.

4.6 Rates

We calculated confidence intervals for the rates assuming the data has a Poisson distribution.

5 RESULTS

The results are presented below, and in the associated Excel spreadsheet ('Entities results DOH April 04(1).xls').

Table one shows the top 10 chemical entities prescribed in QRESEARCH in 2002, the number of prescription items issued, the prescribing rate per 1,000 patient years, and 95% confidence interval for the rate.

Table two shows the top 10 chemical entities dispensed in England in 2002, the number of prescription items issued, and the prescribing rate per 1000 persons from PACT.

Table 1 Top 10 chemical and non-chemical entities prescribed in the pilot QRESEARCH database containing 43 practices during the calendar year 2002

Rank	Chemical/non-chemical entity	Number of prescription items issued	Prescribing rate per 1000 patient-years	95% CI for rate	
1	Aspirin.	124,442	478	475	480
2	Salbutamol.	92,289	354	352	357
3	Atenolol.	92,273	354	352	356
4	Bendrofluazide.	90,719	348	346	350
5	Paracetamol.	65,337	251	249	253
6	Levothyroxine Sodium	62,120	238	237	240
7	Beclomethasone Dipropionate.	60,577	233	231	234
8	Codeine Phosphate. Paracetamol.	60,402	232	230	234
9	Frusemide.	56,079	215	213	217
10	Amoxycillin.	41,766	160	159	162

Source: QRESEARCH pilot43 database, downloaded 23rd October 2003

Table 2 Top 10 chemical entities dispensed in England during 2002 in PACT

Rank	Chemical name	Number of prescription items dispensed	Prescribing rate per 1000 persons
1	Aspirin	20,300,361	410
2	Salbutamol	17,583,032	355
3	Bendrofluazide	14,995,328	303
4	Atenolol	14,708,418	297
5	Levothyroxine Sodium	11,485,883	232
6	Paracetamol	11,329,448	229
7	Amoxicillin	10,696,953	216
8	Beclomethasone Dipropionate	10,005,214	202
9	Frusemide	9,365,334	189
10	Co-Codamol (Codeine Phos/Paracetamol)	9,147,675	185

Sources:PACT: England 2002. ONS mid-year population estimate for England (49,561,800 persons).

5.1 How do the ranks compare?

We found a good correspondence for the top ten chemical entities in QRESEARCH compared with PACT. Every one of the top 10 chemical entities in PACT appeared in the top 10 for QRESEARCH.

There was some variation in the rank order. For example, Atenolol is 3rd and Bendrofluazide is ranked 4th in QRESEARCH whereas the order is reversed in PACT. However, since the absolute rates for each drug are very close then the difference is unlikely to be important.

5.2 What about the absolute rates?

The absolute prescribing rate in QRESEARCH is higher than in PACT for eight of the top ten entities. This is expected since higher rates in QRESEARCH could represent uncashed prescriptions

The rates are close for one item, Salbutamol [354/1000 95% CI 352 to 357], and the confidence interval overlaps the rate form PACT [355/1000].

The prescribing rate for Amoxycillin in QRESEARCH [160/1000 95% CI 159 to 162] is lower than that in PACT [215/1000].

5.3 Are there any significant discrepancies?

Amoxicillin was 10th most commonly prescribed item in QRESEARCH but 7th in the PACT analysis. The absolute rate of prescribing was also substantially lower – the rate in QRESEARCH was 160/1000 [95% CI 159 to 162] and the rate in the PACT was 216/1000].

These differences could reflect differences in prescribing behaviour in the QRESEARCH practices (a higher proportion of QRESEARCH practices are training practices compared with the national average and this might be associated with lower usage of antibiotics for upper respiratory tract infections). Alternatively, it could reflect differences between the age structure of the population estimated for 2002 used to derive the rates from PACT and that in the QRESEARCH database especially if the national estimate under-estimated the number of children..

5.4 How do the top 100 compare?

The Excel spread sheet contains 2 tables. The first table lists all the top 1000 chemical entities in QRESEARCH and the second table lists the same for PACT.

Comparing the two lists, we found that 84% of the top 100 entities in PACT appear in the top 100 in QRESEARCH.

5.5 What about prescribing of antibiotics?

Table 3 shows the antibiotics which appear in the top 100 in PACT. It also compares the rank and the rate from each source. The prescribing rate for each antibiotic is lower in QRESEARCH than PACT with the exception of Trimethoprim where the rates are identical and Penicillin V where the rate is fractionally higher.

There is a good correspondence in the overall rates for Chloramphenicol, Metronidazole, and Fusidic acid.

However, the rates for broad spectrum antibiotics such as Amoycillin, Erythromycin, Cephalexin and Co-amoxiclav are lower in QRESEARCH than in PACT.

Table 3: Most commonly prescribed antibiotics in PACT and the pilot QRESEARCH database

	Overall Rank in PACT	Rate/1000 in PACT	Overall Rank in QRESEARCH	Rate/1000 in QRESEARCH
Amoxicillin	7	216	10	162
Erythromycin	55	52	70	39
Trimethoprim	54	55	49	55
Penicillin V	67	46	58	48
Chloramphenicol	70	43	73	37

Cephalexin	76	37	106	26
Metronidazole	153	18	154	16
Fusidic acid	89	33	96	29
Co-amoxiclav	92	32	105	26

6 DISCUSSION

Each dataset used for analysis has its own, usually unique, limitations and advantages. QRESEARCH looks at the prescriptions issued. In the pilot dataset there is a bias towards larger, teaching practices and the practices are not geographically representative. When the full QRESEARCH dataset is available in summer 2004 some of these issues of representativeness may be resolved.

The PACT dataset cannot be linked to individual patients but is highly regarded for its accuracy and completeness for prescriptions that are dispensed.

Despite these differences, the top 10 entities ranking and rates are very similar in the two datasets. The prescribing of antibiotics, however, showed significantly lower rates in QRESEARCH than PACT for many antibiotics. This may be due to systematic biases in profile of the QRESEARCH practices. We wish to repeat this analysis on the full QRESEARCH dataset when it is available.