

Analysis of paediatric prescribing profiles in two health-funding systems

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Objective. To investigate the adequacy of two large South African medical administrative databases in providing prescribing profiles for paediatricians and general practitioners (GPs) respectively.

Design. Statistical analysis of data captured during 1994. Data were analysed retrospectively with frequency analysis and non-parametric tests.

Setting. Two industry databases, one covering a prepaid health maintenance organisation (HMO), the other providing a chronic medication programme for medical schemes and their members.

Main outcome measures. Comparison of prescribing profiles of specialists and GPs.

Main results. Data from the HMO revealed that referrals to paediatricians were mainly for gastro-intestinal and respiratory problems. Paediatricians' prescriptions for treatment of gastro-oesophageal reflux and/or abdominal pain represented 15.5% of all items prescribed and accounted for 40.7% of total paediatric medicine costs. GPs used formulary items more frequently, and cost per prescription was two-thirds that of specialists. Data from the chronic medication programme were used to compare treatment of asthma by the two provider groups. There were significant differences in the prescribing profiles of the two groups, with specialists using more in the way of 'third-line agents' and newer, expensive products. Significant numbers of prescriptions did not conform to national guidelines for treatment of asthma.

Conclusions. Industry databases provide a viable and valuable source of information; however, some problems were experienced in extracting the required data. Prescribing profiles revealed certain practices that require review, in particular the relatively low use of generic products, the early resorting to drug therapy for gastro-oesophageal reflux, and non-conformity with national guidelines for management of childhood asthma.

S Afr Med J 1996; 86: 672-674.

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Problems in the funding of private sector health care have received widespread coverage in the media, and have been succinctly summarised in an article by Fourie and Marx.¹ In an effort to contain rising health costs, amendments to the Medical Schemes Act were introduced in January 1994.² These amendments were designed, *inter alia*, to enable medical schemes to have greater control over where and how health funds were being spent. In particular, whereas the original Act inhibited clinical audit and utilisation review, under the amended Act these initiatives became possible, and facilitated a change in medical scheme status from simple claims processor to fund manager.³

Administrative data systems offer a powerful tool for population-based health care analysis. To make administrative data useful for measurement of quality and cost-effectiveness, careful attention must be given to information about medical care utilisation, patient characteristics, provider characteristics and health plans or 'packages'.⁴ This study was undertaken to gain insight into the adequacy of two large South African administrative databases. Drug utilisation and specific patient and provider characteristics of two contrasting health plans were analysed. Within these plans we were interested in comparing general practitioner (GP) prescribing profiles with those of paediatricians. Drug utilisation review is an established basis for curtailing inappropriate drug use and reducing drug expenditure.⁵ This study also provided an opportunity to assess the impact of clinical guidelines on the treatment of childhood asthma. These guidelines, which have been formulated, presented and circulated over the years, have recently been restated in the *SAMJ*.⁶

Subjects and methods

Two industry databases were reviewed and analysed.

Medicine claims processing organisation

Within this system, data processed on behalf of a prepaid health maintenance organisation (HMO) were assessed. This HMO includes approximately 130 000 beneficiaries and operates on a preferred provider basis in which the GP has a major 'gatekeeping' function and controls access to specialist care. A medicines formulary has been developed in collaboration with providers.

All claims for the period 1 January to 31 March 1994 were reviewed. Only prescriptions generated by GPs and paediatricians were selected, and for the GP group an attempt was made to select only those prescriptions which related to patients under 16 years of age. All items prescribed were recorded and categorised according to therapeutic class. Each item was costed according to the trade price inclusive of VAT.

Medicines utilisation review organisation

This system has recently been established specifically to review the prescription of drugs used in the management of a variety of chronic diseases. At the request of medical schemes and/or administrators, patients and their doctors co-operate with the organisation, with the sole purpose of

rationalising care. The organisation serves 14 medical schemes, covering some 300 000 beneficiaries.

For the purpose of this study, data pertaining to GPs and paediatricians were extracted and all prescriptions for the treatment of asthma in subjects under 16 years of age were selected. Specific attention was directed at items prescribed, dosages, frequency of administration and drug interactions. Claims for the period January to September 1994 were reviewed.

Statistical analysis (Statpak, Version 4,0; Northwest Analytical, Portland, Oreg.) utilised frequency analysis (chi-square, Fisher's exact test) and the Mann-Whitney test for datasets which were not normally distributed. The study was approved by the University of the Witwatersrand Committee for Research on Human Subjects.

Results

Medicine claims processing database

Data from the HMO included 119 965 GP prescriptions and 408 paediatrician prescriptions. These were generated by some 200 GPs and 8 paediatricians during the period under review.

Frequency analysis of items prescribed by paediatricians and GPs according to therapeutic class shows significantly different prescribing profiles (Table I). Review of items dispensed by GPs suggests that the data apply to a broader range than the 0 - 16 years requested. This conclusion is drawn from the number of prescriptions for substances such as fluoxetine, digoxin, verapamil, furosemide, β -blockers and angiotensin-converting enzyme inhibitors. These are substances variously directed at the treatment of cardiac failure, arrhythmias, depression and hypertension, none of which is prevalent in the 0 - 16-year age group. However, what is apparent from the GP prescriptions is that as 'gatekeepers' they chose to refer mainly patients with respiratory and gastro-intestinal problems to the paediatricians.

Table I. Prescriptions according to therapeutic class (% of total)

Therapeutic class	Paediatricians	GPs
Gastro-intestinal	25.6	10.7
Cardiovascular	2.8	16.4
Hormonal*	8.4	2.5
Anti-infective	11.3	11.8
Musculoskeletal	2.4	12.7
Central nervous system†	9.6	17.1
Respiratory	30.0	14.6

The prescribing profiles are significantly different ($P < 0.0001$) for all categories except anti-infective.
 * Predominantly corticosteroids, used in treatment of asthma.
 † Predominantly methylphenidate used in treatment of hyperactivity.

Medicines prescribed by paediatricians for treatment of gastro-intestinal problems represented 25.6% of all prescription items. Analysis of the data indicates that the primary presenting problems were gastro-oesophageal reflux and/or abdominal pain. In this regard, omeprazole, cimetidine, domperidone and cisapride accounted for 15.5%

of all items prescribed by paediatricians, and accounted for 40.7% of the total paediatric medicine expenditure. In the anti-infective category, some 40% of antibiotics dispensed included various forms of clavulanic acid, cefadroxil and ciprofloxacin. These three antibiotics accounted for over 60% of the cost of antibiotics prescribed by paediatricians. Comparative data on number and cost of items per prescription are shown in Table II, as is the significantly greater use of the formulary by GPs.

Table II. Comparison of paediatric and GP prescriptions

	Paediatricians	GPs
Average No. of items per prescription	1.9	2.4
Average price per item (R)	109.64	58.36
Average price per prescription (R)	209.07	138.24
Formulary items (%)	74	98

All differences are significant ($P < 0.001$) with exception of items per prescription.

Medicines utilisation review organisation

Data from the utilisation review database included 216 GP- and 55 paediatrician-generated prescriptions directed at treatment of asthma in subjects aged under 16 years. Both groups of providers prescribed between 1 and 10 items per prescription. However, frequency analysis showed that the distribution curves were significantly different ($P < 0.05$). The median for GPs was 2 items per prescription, while that for paediatricians was 3 per prescription. Specific items prescribed by the two groups are shown in Table III. These two profiles are significantly different ($P < 0.0001$), with paediatricians prescribing more of the newer inhaled corticosteroids, β -stimulants and antihistamines, while GPs used more salbutamol and theophylline preparations. For those items for which generic equivalents are available (beclomethasone and salbutamol), GPs prescribed generic formulations significantly more often than did paediatricians (49.3% of cases v. 34.0%; $P < 0.05$).

Table III. Prescription of anti-asthmatics by GPs and specialists

Medication	GP prescriptions		Specialist prescriptions		Chi-square statistic*
	No.	%	No.	%	
Beclomethasone	68	13.4	19	11.0	NS
Fluticasone	13	2.6	12	6.9	5.34
Budesonide	20	4.0	6	3.5	NS
Salbutamol	147	29.1	28	16.2	5.59
Fenoterol	60	11.9	17	9.8	NS
Other β -stimulants	18	3.6	17	9.8	7.85
Theophylline preparations	52	10.3	6	3.5	4.95
Antihistamines	16	3.2	15	8.7	6.85
Cromoglycate	36	7.1	19	11.0	NS
Ipratropium bromide	23	4.5	14	8.1	NS
Ketotifen	34	6.7	10	5.7	NS
Other drugs	19	3.6	10	5.8	NS
Total	506	100	173	100	48.12 ($P < 0.0001$)

* Only significant differences shown.

Single items and combinations of drugs per prescription were assessed by a specialist pulmonologist, and categorised in terms of adherence to or deviation from local therapeutic guidelines.⁸ GPs prescribed according to guidelines in 41.7% of cases, while paediatricians conformed in 59.6% of cases. This difference is significant ($P < 0.05$).

Discussion

Health care databases are recognised as valuable sources of data.⁴ However, in South Africa little use has been made of potentially retrievable information, partly as a result of the previous Medical Schemes Act which entrenched guaranteed payment of providers conditional only upon charges being levied according to gazetted scales of benefit. Under the amended Medical Schemes Act, health funders are becoming fund managers rather than claims processors,³ and utilisation review, quality assurance and cost-containment are emerging as important strategies.

This study highlighted several problems in data retrieval. Firstly, both organisations involved, while being totally co-operative, nevertheless required almost 5 months for processing of the requested data. Secondly, whereas the HMO was asked for GP information relating only to patients aged 0 - 16 years, the data provided clearly included subjects beyond the specified age range. Data analysts reviewed their programmes, but the latter result remained the same, indicating a problem in the recording of date of birth and/or age of beneficiaries within the system. Specialist data from the HMO were regarded as being accurate, and showed the preponderance of gastro-intestinal and respiratory problems referred to paediatricians. The frequent use of omeprazole, cimetidine and cisapride by these specialists for treatment of gastro-oesophageal problems warrants scrutiny, and suggests a relatively low threshold for prescription of these products.⁷ Similarly, resorting to ciprofloxacin in ambulatory patients is worthy of mention.⁹

Some of the effects of the abovementioned prescribing practices are shown in Table II: paediatricians prescribe from the formulary more frequently than GPs do ($P < 0.0001$), and their cost per prescription is 1.5 times that of GPs. While it can be argued that effective 'gatekeeping' by GPs is resulting in only the problem cases reaching the specialists, and that such problems require more expensive and more esoteric drugs, frequent usage of products such as omeprazole, cisapride and ciprofloxacin cannot be ignored. Data from the utilisation review organisation also show the significantly lower use of generic products by paediatricians. One may once again argue that the specialists are seeing those problematic cases which need the original products; however, it must be acknowledged that there appears to be a reluctance to use generics. This lack of faith on the part of specialists must be addressed by the profession, the Medicines Control Council and manufacturers, and the role of generics in the treatment of a condition such as asthma must be clarified. While there is evidence of sicker or more problematic patients being seen by paediatricians (Table III, which shows that paediatricians use more fluticasone, β -stimulants other than salbutamol, and antihistamines),

it is possible that these practices also indicate specialist preference for the more recent, so-called 'third-line treatment' products.

The SA Childhood Asthma Working Group's consensus statement on the management of childhood and adolescent asthma⁸ has acknowledged the complex socio-economic issues of health care in South Africa. Two important issues are worthy of mention. Firstly, cheaper anti-asthmatics may not necessarily be more cost-effective in long-term management; secondly, as clearly illustrated in this study, there is a definite need for effective dissemination of guidelines in order to reduce the cost of this disease and also improve overall patient management. Non-adherence to guidelines does not necessarily imply poor management of childhood asthma; in many cases it is a matter of offering more cost-effective management through the use of fewer agents, or avoidance of duplication of treatments which have similar activity. However, the lack of conformity with the therapeutic guidelines⁸ which emerged in this study is of concern, in particular the continued use of theophylline, predominantly by GPs.

The data presented in this study are directed at health care funders and providers. It is hoped that funders will recognise the benefit and value of database development and analysis, and that providers will be stimulated to review their practices. Unfortunately, the literature suggests that simple feedback along these lines is relatively ineffective in modifying behaviour. Other strategies such as specific feedback to individuals and peer review are more likely to achieve results.^{9,10} Whichever method is used, nothing can take place unless the data are available. For this reason, every effort should be made to implement and comply with health information data collection systems, whether in individual, group, hospital or community practices.¹¹

The authors acknowledge the assistance and support of Mr David Boyce and Mrs Geraldine Bartlett of TPS/Medikredit, Johannesburg, and Dr John Cowlin of Quality Health Services (Pty) Ltd, Cape Town.

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Accepted 17 July 1995.