

Generic prescribing: A cross-sectional study comparing the prescribing practices of a HSE and a NHS hospital

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CLINICAL POINTS

- Generic prescribing was found to be significantly lower in a HSE hospital compared to a NHS hospital.
- Generic prescribing has a definite cost benefit and a potential safety benefit to patients.
- Clear handwriting on drug charts may reduce prescription error rates.
- Clinical pharmacist chart review provides the opportunity to both reduce medication errors and to enhance generic prescribing rates.
- Undergraduate medical curriculum should include a dedicated clinical therapeutics module.
- HSE hospitals should consider the introduction of a hospital prescribing formulary.

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INTRODUCTION

Prescribing is a central element in the life of contemporary medical practitioners. The adage “the pen is mightier than the sword” has never been more apt; modern medicines can bring about a potential cure to many conditions that previously were only considered treatable via surgery or not at all. However, with this power comes the responsibility of making ethical clinical prescribing decisions in the context of a finite healthcare budget. Central to the theme of responsible prescribing is the issue of generic versus proprietary prescribing. Generic prescribing is widely regarded as best practice medicine¹.

Generic medications, by definition, contain the same active ingredients as their proprietary counterparts. Upon conception, a new drug must navigate its way through clinical trials until both its safety and clinical efficacy are approved by the relevant regulatory bodies; the Irish Medicines Board carries out this task in Ireland. On introduction to the market, this new drug is protected by a patent, giving the parent pharmaceutical company exclusive rights to production and sale of the drug for a specified time period under a proprietary or brand name. When the patent expires, the drug can then be produced by any pharmaceutical company in the form of a generic medication, which contains the same active compound as

ABSTRACT

Background: Generic prescribing is currently a politically important topic in Ireland as it is seen as a potential source for easing the healthcare budget.

Objective: To compare prescribing practices at a Health Service Executive (HSE) and a National Health Service (NHS) hospital, with an emphasis on the level of generic prescribing.

Design: A comparative cross-sectional study.

Data Source: Bedside drug charts and medical notes of surgical and medical inpatients.

Methods: Each ward in the respective hospitals was sampled once between July 2009 and September 2009; all patients (over age 17 years) present were included as subjects at the time of assessment. Patient demographics, in addition to the name, dose, frequency, and route of administration of prescribed drugs, were recorded. Clinical pharmacist (CP) review was also noted. A database was constructed for statistical analysis.

Results: HSE hospital patients (n=301) and NHS hospital patients (n=296) received 3640 drug prescriptions (52.5% generic) and 3962 prescriptions (79.7% generic), respectively. A lower level of CP chart monitoring was noted in the HSE hospital (41.5% versus 97%, p<0.001). The rate of drug chart errors was 4.2% in the HSE and 1.5% in the NHS hospital. For all proton pump inhibitors (PPIs) prescribed in the HSE hospital, generic substitution could have saved €23.83/day, according to the Monthly Index of Medical Specialities (MIMS).

Conclusion: Increased generic prescribing in the HSE hospital has potential cost and safety benefits.

the proprietary medication but now under a different name. There may be a slight difference between generic and proprietary drugs in the ultimate composition of the formulation when considering non-active ingredients or excipients. This difference is usually of little clinical consequence, with the exception of some medications that have a narrow therapeutic index or some anti-epileptic drugs². There is a misconception that generic medications are not as safe as their proprietary counterparts. Indeed, generic medications must meet the same standards of clinical safety and efficacy as the proprietary medication in order to enter the market³.

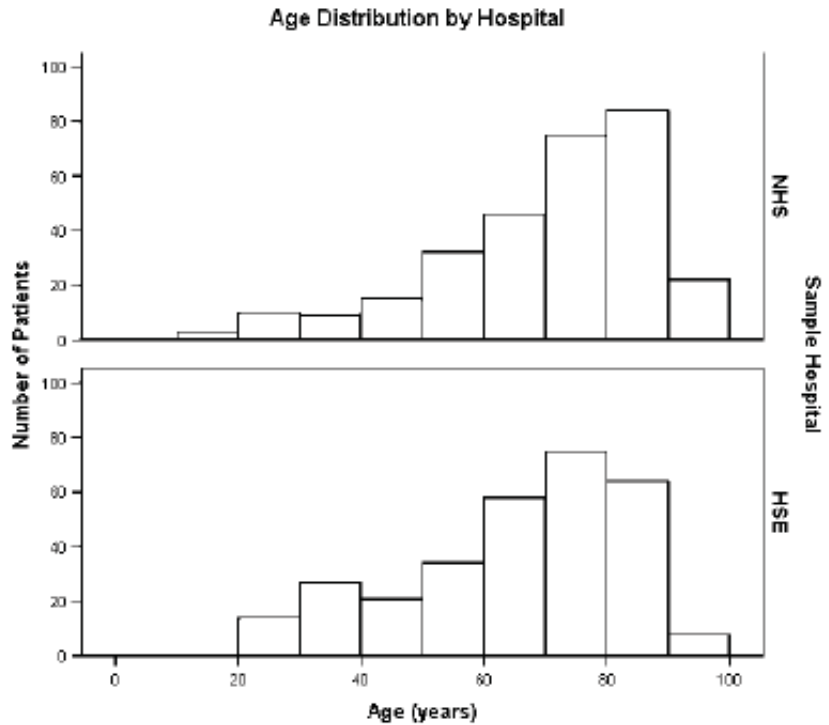
In Ireland, medications account for approximately 13.5% of the health-care budget⁴. Policy makers believe increased generic prescribing could be a source of potential savings^{5,6,7,8}. The Health Service Executive (HSE) of Ireland is regarded as having a relatively low rate of generic prescribing in contrast to the National Health Service (NHS) in the United Kingdom (UK), which promotes high levels of generic prescribing in all areas of healthcare⁹. A literature search using Pubmed, Medline, and Embase revealed that no study exists comparing hospital prescribing practices in the HSE and NHS; this study intends to address this deficit.

OBJECTIVE

The aim of this study was to compare prescribing practices at a HSE and a NHS hospital, with an emphasis on the level of generic prescribing.

METHODS

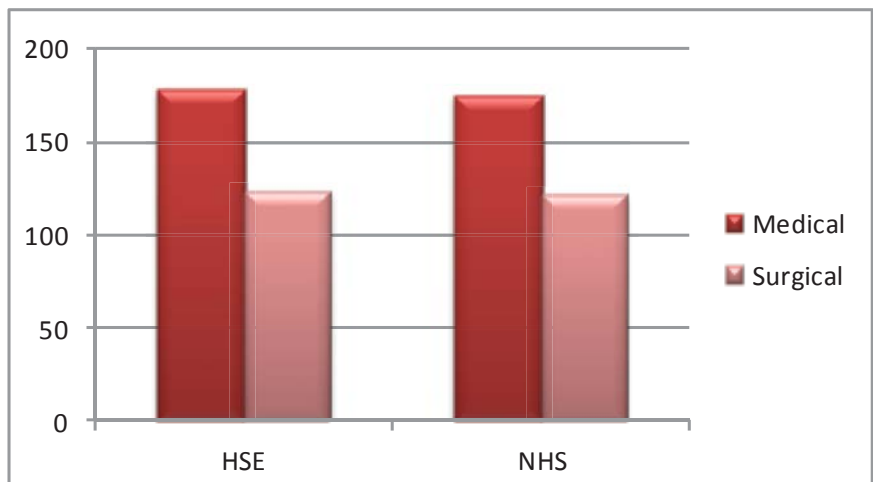
A comparative cross-sectional study was designed to elicit any differences in prescribing practices between a HSE and a NHS hospital. The respective HSE and NHS hospitals were chosen as the study centres due to similar bed capacities and service case-mix-



▲ Figure 1: Age distribution of subjects by hospital

es. Ethical approval was granted from the ethics committees of each institution. Inclusion criteria specified that subjects should be medical or surgical inpatients over the age of 17 years, and their bedside drug charts and medical notes provided the data source for this study. Data collection was performed by a single researcher

and was carried out at the NHS hospital between 23/07/09 – 12/08/09 and from 21/08/09 – 10/09/09 at the HSE hospital. Each relevant ward was sampled once and all patients on the ward at the time of sampling were included as subjects. Approximately 40% of the data collection in each hospital took place over a weekend.



▲ Figure 2: Breakdown of subject numbers under medical or surgical care by hospital

ORIGINAL RESEARCH

HSE Hospital		NHS Hospital	
Paracetamol	212	Paracetamol	217
Innohep	101	Aspirin	146
Aspirin	88	Enoxaparin	134
Lactulose	79	Cyclizine	118
Movicol	68	Octenisan	112
Tramadol	65	Simvastatin	109
Senna	57	Naseptin	107
Furosemide	51	Senna	92
Atorvastatin	45	Dramorph	90
Stemetil	41	Omeprazole	35

▲ **Table 1:** List of the 10 most commonly prescribed medications by hospital.

	HSE Hospital	NHS Hospital
Generic	52.5%	79.7%
Proprietary	41.7%	10.7%
Appropriate proprietary	5.7%	9.6%

▲ **Table 2:** Percentage of all medications prescribed in generic, proprietary and appropriate proprietary format by hospital.

	HSE Hospital	NHS Hospital
Generic	53.5%	80.4%
Proprietary	42.8%	16%
Appropriate proprietary	3.7%	3.6%

▲ **Table 3:** Percentage of O.O, PRN, and parenterally administered drugs in generic, proprietary, and appropriate proprietary format by hospital.

The data collection was performed such that no patient identifiers were stored to ensure anonymity.

Demographic details of the subjects, in addition to the name, dose, frequency, and route of administration of prescribed drugs, were recorded. Whether a clinical pharmacist (CP) reviewed the drug chart was also noted. Prescribers' handwriting clarity was subjectively assessed as adequate or

poor based on the ease of legibility by the researcher carrying out data collection. Medications were classified as generic, proprietary, or appropriate proprietary; drugs considered appropriate proprietary were prescribed as proprietary combinations of two or more drugs in fixed doses (e.g. Sinemet®). Cost evaluations for the HSE and NHS hospitals were based on the prices stated in the Monthly Index of Medical Specialties

(MIMS) Ireland August 2009 and the British National Formulary⁵⁷, respectively. For the MIMS-based costs, the generic cost was deduced by substituting the cost of the cheapest available bioequivalent generic medication in the correct dose formulation for the prescribed proprietary medication.

All data was input into Microsoft Access® 2007; statistical analysis was performed in SPSS version 14. Chi-squared tests were employed to perform subgroup analysis of categorical variables; Student's t-test was used to compare continuous variables by subgroups.

RESULTS

PATIENT CHARACTERISTICS

Data on 301 and 296 subjects were collected in the HSE and NHS hospitals, respectively. An analysis of the population variables revealed NHS subjects to be more elderly [mean ages: HSE 65 years versus NHS 71 years ($p=0.002$) Figure 1]. Males accounted for 56% and 48% of the HSE and NHS subjects, respectively ($p<0.05$). While the absolute numbers of medical and surgical patients were different in each hospital, the difference in proportion between hospitals was not significant (Figure 2). Furthermore, there was no significant difference in the level of generic prescribing between medical and surgical patients in both hospitals.

PRESCRIBING PRACTICES

A total of 3640 and 3962 medications were prescribed to HSE and NHS subjects, respectively. This equated to a mean of 12.1 ($SD=5.6$) medications per subject in the HSE hospital as opposed to 13.4 ($SD=5.6$) in the NHS hospital ($p<0.05$). The ten most commonly prescribed medications to study subjects are listed in Table 1.

A clinically significant higher level of generic prescribing was seen in the NHS hospital (79.7% generic) compared to the HSE hospital (52.5% generic) ($p < 0.001$, Table 2).

Similar analysis was performed to consider once only (O.O), pro re nata (PRN), intramuscular, intravenous and subcutaneously administered medications, which are drug forms only prescribed in hospital (Table 3). A clinically significant higher level of generic prescribing was seen in the NHS hospital (80.4% generic) compared to the HSE hospital (53.5% generic) ($p < 0.001$).

In addition, 41.5% of HSE drug charts had been reviewed by a CP as opposed to 97% in the NHS hospital ($p < 0.001$). 34.9% of HSE drug charts contained at least one error compared to 17.2% of NHS drug charts ($p < 0.001$). Based on individual prescriptions, an error rate of 4.2% was calculated in the HSE hospital as opposed to 1.5% in the NHS hospital ($p < 0.05$). Handwriting was subjectively assessed as “poor” in 14.3% of HSE bedside charts compared to 6.4% in the NHS hospital ($p = 0.002$). A breakdown of prescribing errors is displayed in Table 4.

COST

In the HSE hospital, 74 patients had proton pump inhibitors (PPIs) prescribed in a proprietary format despite the presence of an off-patent generic being available. With reference to these 74 prescriptions, savings of €23.83/day could have been achieved had they been prescribed in the generic format.

DISCUSSION

One of the first prescribing lessons taught to undergraduate medical students is to use generic medication where possible. The reasoning behind this lesson is threefold. Firstly, generic medications are gen-

	HSE Hospital	NHS Hospital
Illegible	1	1
Inappropriate decimal point	62	17
No dose	2	0
No route	1	0
No units	19	2
Wrong dose	22	17
Wrong name	4	1
Wrong route	1	4
Wrong units	40	18

▲ Table 4: Number of errors by category by hospital

erally cheaper than their proprietary counterparts, therefore minimising cost. The widely used EASE (Effective, Appropriate, Safe, and Economic) model of medication prescribing recognises this concept^{10,11}. Increased generic prescribing could have saved €21.8 million in Ireland in 2003 from expenditure on the Drug Payment Scheme and the General Medical Card scheme¹². Secondly, undergraduate and postgraduate teaching, in addition to medications referenced in the literature, discuss medications using the generic name. It would be logical to extend use of this common language of medications into clinical practice. Thirdly, from a practical view point, using generic naming facilitates pharmacists as the logistical pressure of proprietary prescribing is eased. More importantly than simple logistics, the pharmacist may elect to dispense the cheapest available formulation.

In this study, 41.7% of the HSE hospital prescriptions were in the proprietary format. In contrast, 20.1% of prescriptions were of a proprietary nature in the NHS hospital. The fact that the baseline population demographics were well matched, with the exception of age, adds to the significance of this result. From first principles, a

more elderly population in the NHS hospital would not confound the analysis of generic prescribing rates. The similarity of the proportion of medical and surgical subjects in both hospitals is an important finding as it has been reported that prescribing tends to be of a poorer quality in surgical wards¹³. The current study found no statistically significant difference in the proportion of generic prescriptions between the medical and surgical specialities.

These results add to the growing evidence demonstrating that the rate of generic prescribing in Ireland is low^{14,15,16}. Bennett et al found generic prescribing to be as low as 4.6%¹⁷. This contrasts sharply with the situation in the UK where prescribing is predominantly generic in accordance with the British National Formulary (BNF). The percentage of generic prescriptions written in the UK rose from 38% in 1985 to 69% in 1998¹⁸. Indeed, a recent paper estimated that approximately 80% of prescriptions in the UK are now filled using generic names¹⁹. The current study findings are in agreement with that estimate.

There are a number of reasons to potentially explain the discrepancy seen in prescribing practices of physi-

Ireland. This publication provides medication wholesale costs to retail pharmacies but does not accurately reflect hospital pharmacy costs.

CONCLUSION

Greater levels of generic prescribing in healthcare have a theoretical safety benefit to patients as well as a definite cost benefit. This study highlights that a higher level of generic prescribing could be achieved in the respective HSE hospital if prescribing practices were improved. Enhancing education to prescribing physicians both at an undergraduate and postgraduate level provides the opportunity to promote generic prescribing practices. Other measures such as adopting a generic drug formulary would have a further impact on the proportion of generic prescribing in HSE hospitals. In addition, an increased level of CP drug chart monitoring not only permits the opportunity to ensure generic drug use but may also reduce prescribing errors. This study then, while circumspect to generalise from single institutions, provides evidence of room for systemic improvement in HSE prescribing practices which would be beneficial to the individual patient and the wider population.

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REFERENCES

- 1 Guidance on prescribing. BNF 2009;58:1.
- 2 Andermann F, Duh MS, Gosselin A, Paradis PE. Compulsory generic switching of antiepileptic drugs: high switchback rates to branded compounds compared with other drug classes. *Epilepsia*. 2007; 48: 464-469.
- 3 Birkett DJ. Generics - equal or not? *Aust Prescr* 2003;26:85-87.
- 4 Barry M. Economies and drug usage in the Irish healthcare setting. [www.indi.ie/docs/878_economies_drug_usage_\(2\).pdf](http://www.indi.ie/docs/878_economies_drug_usage_(2).pdf) Accessed 22 February 2010.
- 5 Audit Commission. A prescription for improvement: towards rational prescribing in general practice. *Br Med J* 1994;308:731-732.
- 6 Tilson L, McGowan B, Ryan M, Barry M. Generic drug utilisation on the General Medical Services (GMS) scheme in 2001. *Ir Med J*. 2003;96:176-179.
- 7 McCarthy C. Report of Special Group on Public Service Numbers and Expenditure Programmes (McCarthy Report) 16 July 2009. www.finance.gov.ie/documents/pressreleases/2009/bl100vo11.pdf Accessed 27 December 2009.
- 8 Baxter G. Generic prescribing should be protocol, say recommendations. *Irish Medical Times* 16 July 2009.
- 9 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;5:341-344.
- 10 Parish PA. Drug prescribing – the concern of all. *J Roy Soc Health* 1973;4:213-217.
- 11 Barber N. What constitutes good prescribing? *Br Med J* 1995;310:923-925.
- 12 Tilson L, Bennett K, Barry M. The potential impact of implementing a system of generic substitution on the community drug schemes in Ireland. *Eur J Health Econ* 2005;6:267-273.
- 13 Hemeryck L, Chan R, Sabra K, Feely J. Poor utilisation and limited impact of formularies on quality of prescribing by hospital doctors. *Ir Med J* 1996;89:173-174.
- 14 McGettigan P, McManus J, O'Shea B, Chan R, Feely J. Low rate of generic prescribing in the Republic of Ireland compared to England and Northern Ireland: prescribers' concerns. *Ir Med J*. 1997;90:146-147.
- 15 Tilson L, McGowan B, Ryan M, Barry M. Generic drug utilisation on the General Medical Services (GMS) scheme in 2001. *Ir Med J*. 2003 Jun;96:176-179
- 16 Barry M, Tilson L, Ryan M. Pricing and reimbursement of drugs in Ireland. *Eur J Health Econ*. 2004 Jun;5:190-194.
- 17 Williams D, Bennett K, Feely J. The application of prescribing indicators to a primary care prescription database in Ireland. *Eur J Clin Pharm* 2005; 61:127-133.
- 18 Department of Health. Statistics of prescriptions dispensed in the community: England 1988-98. *Statistical Bulletin* 1998;15.
- 19 Kanavos P. Do generics offer significant savings to the UK National Health Service? *Curr Med Res Opin*. 2007;23:105-116.
- 20 Godlee F. Doctors, patients, and the drug industry. *Br Med J* 2009;338:b463.
- 21 Krumholz HM, Ross JS. Relationships with the drug industry: More regulation, greater transparency. *Br Med J* 2009;338:b222.
- 22 Holland R, Desborough J, Goodyear L, Hall S, Wright D, Loke YK. Does pharmacist-led medication review help to reduce hospital admission and death in older people? A systematic review and meta-analysis. *Br J Clin Pharmacol* 2007;65:303-316.
- 23 Hanlon JT, Lindblad CI, Gray SI. Can clinical pharmacy services have a positive impact on drug-related problems and health outcomes in community-based older adults? *Am J Geriatr Pharmacother* 2004;2:3-13.
- 24 Zermansky AG, Petty DR, Raynor DK, Freemantle N, Vail A, Lowe CJ. Randomised controlled trial of clinical medication review by a pharmacist of elderly patients receiving repeat prescriptions in general practice. *Br Med J* 2001;323:1340.
- 25 An in depth investigation into causes of prescribing errors by foundation trainees in relation to their medical education. EQUIP study. 03/12/2009. <http://www.gmc-uk.org/about/research/5155.asp> Accessed 09 January 2010.
- 26 Mark Pownall. Complex working environment, not poor training, blamed for drug errors. *Br Med J* 2009;339:b5328.
- 27 Aronson JK, Barnett DB, Breckenridge AM, Ferner RE, Jackson P, Maxwell SR, McInnes GT, Rawlins MD, Ritter JM, Routledge P, Walley TJ, Webb DJ, Williams D, Woods KL. The UK's NHS and pharma: need for more clinical pharmacologists. *Lancet* 2009;373:1251-1252.
- 28 Members of EMERGE, Erice Medication Errors Research Group, Agrawal A, Aronson JK, Britten N, Ferner RE, de Smet PA, Fialová D, Fitzgerald RJ, Likić R, Maxwell SR, Meyboom RH, Minuz P, Onder G, Schachter M, Velo G. Medication errors: problems and recommendations from a consensus meeting. *Br J Clin Pharmacol*. 2009;67:592-598.
- 29 Tichelaar J, Richir MC, Avis HJ, Scholten HJ, Antonini NF, De Vries TP. Do medical students copy the drug treatment choices of their teachers or do they think for themselves? *Eur J Clin Pharmacol* 2009; 10.1007/s00228-009-0743-3.
- 30 Velo GP, Minuz P. Medication errors: prescribing faults and prescription errors. *Br J Clin Pharmacol* 2009;67:624-628.
- 31 Batuwitage BT, Kingham JGC, Morgan NE, Bartlett RL. Inappropriate prescribing of proton pump inhibitors in primary care *Postgrad Med J* 2007;83:66-68.
- 32 Pillans PI, Kubler PA, Radford JM, Overland V. Concordance between use of proton pump inhibitors and prescribing guidelines. *Med J Aust* 2000;172:16-18.
- 33 Naunton M, Peterson GM, Bleasel MD. Overuse of proton pump inhibitors. *J Clin Pharm Ther* 2000;25:333-340.
- 34 Nardino R, Vender RJ, Herbert PN. Overuse of acid-suppressive therapy in hospitalised patients. *Am J Gastroenterol* 2000;95:3118-3122.
- 35 Niklasson A, Bajor A, Bergendal L, Simrén M, Strid H, Björnsson E. Overuse of acid suppressive therapy in hospitalised patients with pulmonary diseases. *Respir Med* 2003;97:1143-1150.
- 36 Shi S, Klotz U. Proton pump inhibitors: an update of their clinical use and pharmacokinetics. *Eur J Clin Pharmacol* 2008;64:935-951.