# 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.

## 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  $\epsilon$ 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.

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Best Research

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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 medicine<sup>1</sup>.

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

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 drugs<sup>2</sup>. 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 market<sup>3</sup>.

In Ireland, medications account for approximately 13.5% of the healthcare budget<sup>4</sup>. Policy makers believe increased generic prescribing could be a source of potential savings<sup>5,6,7,8</sup>. 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.

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

TSMJ | 2010 | Volume 11 • • •

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

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

	HSE Hospital	NHS Hospital
Generic	<b>52.5</b> %	<b>79.7</b> %
Proprietary	<b>41.7</b> %	<b>10.7%</b>
Appropriate proprietary	<b>5.7</b> %	<b>9.6</b> %

▲ 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	<b>42.8</b> %	<b>16</b> %
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.

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 Formulary<sup>57</sup>, 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<sup>®</sup> 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  $\epsilon_{23.83}$ /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<sup>10,11</sup>. 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 scheme<sup>12</sup>. 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 wards<sup>13</sup>. 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<sup>14,15,16</sup>. 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 names<sup>19</sup>. 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-

cians. Many suspect that prescribing doctors are influenced by pharmaceutical company-sponsored events, and it has been suggested that part of the problem has resulted from a subtle collusion between the two parties<sup>20</sup>. Recently, a six-point plan was published to address the interaction of the pharmaceutical industry with prescribing doctors<sup>21</sup>. Two key recommendations within this plan include that pharmaceutical industrysponsored continuing medical education should be abolished and that doctors should forgo industry gifts. To many, these are key issues, as they influence doctors' prescribing habits, making the use of proprietary agents more likely.

A potential confounding factor influencing the level of proprietary prescribing seen in the HSE hospital in the current study was that patients may have had certain medications prescribed to them prior to admission to hospital. To account for this, an analysis of the prescribing breakdown of O.O, PRN, and parenterally administered medications was undertaken. With few exceptions, these forms of medications are prescribed on an inpatient basis. There was a similar and equally low level of generic prescribing among the hospitalexclusive subset of medications comparable to the overall level observed in the HSE hospital (See Table 2 and Table 3). This highlights that the level of generic prescribing by medical professionals in the HSE hospital is low. As inpatient drug charts are typically written by a junior doctor, educational interventions in this group have the potential to improve prescribing practices.

CPs are regarded as the guardians of hospital prescribing. There is good evidence confirming the net positive benefit this speciality brings to the healthcare community<sup>22,23,24</sup>. Responsibilities of the CP include review of drug charts and identifying and attending to any prescribing errors. There is a possible association between the lower level of generic prescribing in the HSE hospital and the lower level of CP drug chart review. Increased CP input is seen as a potential method to both reduce the prescription error rate and to possibly alter prescribing habits in the HSE hospital. This may be achieved by allowing the CP to substitute a proprietary prescription for a generic.

The issue of medication errors is currently contentious. Recently, the General Medical Council UK commissioned the EQUIP (Errors-Questioning Undergraduate Impact on Prescribing) study to look at prescribing errors among newly qualified doctors in relation to their medical education<sup>25</sup>. The results showed that newly qualified junior doctors' medication error rate did not differ significantly from their more experienced colleagues. The report strongly encourages the need to increase the emphasis of clinical pharmacology in the undergraduate medical curriculum<sup>26</sup>, which many feel is inadequate at present<sup>27,28</sup>. The medical school affiliated with the studied NHS hospital has a 17-week intensive course which combines the core subjects of medicine, surgery, and therapeutics. No dedicated therapeutics course exists in the current undergraduate curriculum of the medical school affiliated with the HSE hospital in this study. It is hypothesised that increased clinical therapeutics teaching would lead to better prescribing habits once qualified<sup>29</sup>. The EQUIP study also recommended the adoption of a standard drug chart throughout the NHS to facilitate a reduction in drug errors.

Poor handwriting of the prescribing physician is often the culprit for medication errors<sup>30</sup>. Despite the subjectivity of the assessment, the higher level of poorly written charts in the HSE hospital poses the opportunity for intervention. A standardised national drug chart may mitigate the effect of poor handwriting as contextual clues on an easily recognised chart would aid understanding.

In Ireland, the proportion that medicines contribute to the overall budget of the General Medical Scheme is significant and is thus a target for cost reductions. Among the methods outlined to achieve such savings are proposals to increase the frequency of generic prescribing. The Department of Health in the UK is hoping to adopt a tactic wherein a pharmacist can substitute a generic drug for certain medications prescribed in the proprietary format. The ultimate aim of such an intervention would be to save money without adversely affecting the quality of care provided. In addition, PPIs have come under scrutiny as many feel they are frequently prescribed without proper indication<sup>31,32,33,34,35</sup>. This group of medications is relatively expensive, however, omeprazole, lansoprazole, and pantoprazole are now off-patent and available generically. As all PPIs have an identical mode of action, it is reasonable to prescribe a cheaper generic alternative to gain the same class-effect benefit<sup>36</sup>. 74 proprietary PPIs were prescribed at the studied HSE hospital despite the availability of an off-patent generic. Had these drugs been prescribed generically, savings of €23.83 per day would have been realised.

This study had several potential weaknesses. Despite analysing several hundred patients from each hospital selected, only one hospital was considered from each healthcare system. A larger sample of hospitals would be needed to generalise conclusions; this study compares the two hospitals as typical examples of their respective system. In addition, cost analysis was done using the MIMS

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 svstemic improvement in HSE prescribing practices which would be beneficial to the individual patient and the wider population.

#### ACKNOWLEDGEMENTS

We would like to thank Mr. P. G. Watts, Consultant Oral and Maxillofacial Surgeon, for his time and assistance in helping this project receive ethical approval in the UK. We would also like to thank the nursing staff in the respective study centres for permitting data collection during their busy schedules.

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