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Ongoing Measures to Enhance Prescribing Efficiency Across Europe: Implications for Other Countries

Brian Godman, BSc, PhD[1,2,3], Stephen Campbell, PhD[4,5], Hae Sun Suh, PhD[6], Alexander E Finlayson, MD[7], Marion Bennie, MSc[2,8], and Lars L Gustafsson, MD, PhD[1]

[1]Department of Laboratory Medicine, Division of Clinical Pharmacology, Karolinska Institutet, Karolinska University Hospital Huddinge, SE-141 86, Stockholm, Sweden
[2]Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde, Glasgow, UK
[3]National Institute for Science and Technology on Innovation on Neglected Diseases, Centre for Technological Development in Health, Oswaldo Cruz Foundation (Fiocruz), Rio de Janeiro, Brazil
[4]Centre for Primary Care, Institute of Population Health, University of Manchester, Manchester M13 9PL, UK
[5]NIHR Greater Manchester Primary Care Patient Safety Translational Research Centre, University of Manchester, Manchester M13 9PL, UK
[6]Research and Development Centre, Health Insurance Review & Assessment Service (HIRA), Seoul, Korea
[7]Department of Primary Care Sciences, Oxford University, Oxford, UK
[8]Public Health and Intelligence Strategic Business Unit, NHS National Services Scotland, Edinburgh, EH12 9EB, UK

Address for Correspondence:
Brian Godman, BSc, PhD
Department of Laboratory Medicine, Division of Clinical Pharmacology, Karolinska Institutet, Karolinska University Hospital Huddinge, SE-141 86, Stockholm, Sweden
Tel: +46 8 737 40 81
Fax: +46 8 7374010
E-mail: Brian.Godman@ki.se

Objectives: Pharmaceutical expenditure has risen rapidly resulting in multiple reforms across countries. This includes Korea. Review policies and initiatives undertaken in Europe to improve the quality and efficiency of prescribing of both new and established drugs to provide guidance. **Methods:** Principally a narrative review of papers. **Results:** New models have been developed to optimise the managed entry of new drugs centring on three pillars of pre-, peri-, and post-launch activities. Scrutiny of prices of new drugs will increase given typically their limited health gain and high requested prices. Successful measures have enhanced the prescribing of low cost generics versus originators and patent products in a class releasing considerable resources. In addition, improve the quality of care through high adherence to an essential medicine list. **Conclusion:** We hope by providing details of reforms across Europe, and their influence, we have stimulated debate in Korea regarding potential measures to consider in the future.

Key Words Demand-side measures · Introduction new drugs · PPIs · Renin-angiotensin inhibitor drugs · Statins · Supply-side measures.

Introduction

Pharmaceutical expenditure is under increasing scrutiny world-wide.[1-5] Pharmaceutical expenditure rose by more than 50% in real terms during the past decade among OECD countries, averaging 17.5% of total healthcare expenditure in 2009.[6,7] This was lower than 29.2% and 25.4% of total expenditure in Korea in 2005 and 2006 respectively,[8-10] which in turn was lower than 60% of total expenditure in some countries.[11] This rise has resulted in pharmaceutical expenditure becoming the largest, or equaling the largest, cost component in ambulatory care.[1-4,12-15] In addition, typically the fastest growing cost component in healthcare.[4,15,16] This will continue unless actively addressed, driven by well known factors. These include ageing populations, rising patient expectations, strict clinical management targets and the continued launch of new premium priced technologies.[1-7,12-18] These factors threaten the ability of European countries to maintain their ideals of equitable and comprehensive healthcare for their citizens, resulting in multiple reforms and initiatives.[5,6,12-14,18] A number of reforms have also been instigated in Korea in the past three to four years to help control pharmaceutical costs and maintain the sustainability of its health insurance system.[8-10,19-24]

The various reforms and initiatives to enhance the quality and efficiency of prescribing can be divided into those for new drugs and those for established drugs. Initiatives for new drugs include robust pricing and reimbursement processes along with potentially risk sharing arrangements.[25-31] This is because new premium priced drugs are seen as the major challenge among European countries to maintain their ide-

als.[17,25,26,31] This is exacerbated by the cost of new cancer and other drugs now typically exceeding US$10000 per patient per month or more, which is already causing funding concerns.[6,31-36] Without recent initiatives, new innovative premium priced drugs would struggle for funding. This is already happening in some countries, and is not in the best interest of any stakeholder group.[6,18,31,33,34,37] Consequently, an extension of this situation needs to be avoided. Measures for established drugs include initiatives to increase the prescribing of low cost generic drugs versus originators and patented products in the class without compromising care as well as general price reductions.[1,2,5,6,12-16,24,38,39] The objective of the former is to take advantage of global sales of pharmaceutical products losing their patents between 2008 and 2013 estimated at US $50 to 100 bn/year (€35-70), and US$255 bn/year between 2011 and 2016, out of total pharmaceutical sales of US$820 bn in 2009 (€579 bn).[5,6,40-42] The World Health Organization also endorses the use of generics when discussing the rational use of medicines to release resources to maximise health gain with available budgets.[6,26,43,44]

Reforms for established drugs can be divided into supply- and demand-side reforms. Supply-side measures include initiatives to obtain low prices for generics as well as compulsory price cuts.[1,2,5,6,12-16,24,38,39] Demand-side measures include initiatives to enhance the prescribing and dispensing of generics. This includes encouraging their prescribing versus patented products in a class where all drugs are seen as essentially similar. Initiatives include educational activities, prescribing targets, financial incentives, compulsory International non-proprietary name (INN) prescribing and prescribing restrictions.[1-6,12-16,18,45-55] This includes promoting generics even when these are different salts to the originator with a lower number of indications once bioequivalence has been demonstrated, e.g., generic clopidogrel.[56] In addition, promoting lower cost medicines where generics are available in a class, e.g., Belgium and Germany.[6,45,55,57,58] Initiatives also include additional co-payments for more expensive products than the reference price drug, which can be for the molecule (Anatomical Therapeutic Chemical - ATC - Level 5) or the class/therapeutic area (ATC Level 3 or 4).[59-61] Classes where all products are seen as essentially similar include the proton pump inhibitors (PPIs), statins and renin-angiotensin inhibitor drugs - angiotensin converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs).[5,6,12-16,45,46,48-51,55,62-64]

Other measures include delisting medicines from national reimbursement lists where there are concerns with their effectiveness, safety or value.[2,13] They also include initiatives to enhance adherence to a selected list of well proven drugs to improve subsequent care through enhancing familiarity.[13,65] As a result, reduce adverse drug reactions (ADRs) and potential drug: drug interactions. Average treatment costs for a single ADR in Germany were estimated at approximately €2250, equating to €434 million per year,[66] with the cost of emergency related admissions in the UK due to ADRs estimated at GB£2 billion annually.[67] In the US, the cost of drug-related morbidity and mortality exceeded US$177 billion alone in 2000.[68]

A number of these measures have been introduced in Korea during the past 3 to 4 years. These include pricing policies for generics, compulsory price cuts, a positive list of drugs, formal procedures for reimbursing new drugs based on their value and budget impact, prior authorisation for prescribing drugs outside of their label, drug utilisation reviews as well as incentives for clinics and for therapeutic substitution to lower cost but equally effective drugs.[9,10,19-24] However, additional reforms may be needed especially with the proposed abolishing of patient co-payments for drugs to treat cardiovascular and cerebrovascular diseases as well as rare diseases and cancers.

Consequently, the objective of this paper is to review a selection of policies and initiatives undertaken in Europe to optimise the managed entry of new drugs, as well as improve the quality and efficiency of prescribing for established drugs, to provide potential guidance to Korea.

Methods

This is principally a narrative review of papers taken from the extensive number of publications involving the authors or known to them. Case histories have been included where pertinent, again based on publications or internal health authority documents known to the authors.

We did not undertake a systematic review of published papers concerning generics, as this has already been performed by the authors and others.[1,5,6,12,15,47,48,50,60,61] We also did not critique the quality of the papers as a number of these are reviews rather than primary research. In addition, internal health authority documents or other information available on the Internet where pertinent. However, we believe our approach is valid given the extensive experience and publications among the various authors on relevant subjects. In addition, we have used the same approach in other publications aimed at providing guidance to health authorities.[1,5,6,12,14,15]

Where pertinent, demand side measures have been broken down by the 4Es - Education, Economics, Engineering and Enforcement (Table 1).[1,69] The objective is to enhance comparison of the influence of different demand-side measures between countries.

Results

These will be divided into measures to optimise the man-

Table 1. Examples and definitions of the 4Es[1,2,5,6,13,18,26,46,48,50-53,65,70-75)]

4E category	Definition and examples
Education	Programmes that influence prescribing through educational activities, e.g.:
	• Distribution of printed guidelines and guidance including essential drug lists such as the 'Wise List' in Stockholm, Sweden
	• Benchmarking of prescribing against colleagues
	• Monitoring of prescribing against agreed guidance and/or targets coupled with educational feedback where pertinent
	• Academic detailing by health authority/health insurance company personnel or contracted colleagues on a one-to-one basis or in groups
	• Encouraging INN prescribing through educational activities in the UK including education in medical schools with monitoring in ambulatory care
Engineering	Organizational or managerial interventions leading to changes, e.g.:
	• Prescribing targets which can include both quality and efficiency targets
	• Disease Management Programmes
	• Agreed generic substitution rates in community pharmacies
	• Price: volume agreements for both new and established drugs
Economics	Financial interventions (positive and negative), e.g.:
	• Devolved budgets to physicians combined with financial incentives for staying within agreed budgets
	• Additional patient co-payments for a more expensive drug than the current referenced price drug for the molecule (ATC Level 5) or class/therapeutic area (ATC Level 3 or 4)
	• Physician financial incentives for achieving agreed quality or efficiency targets such as the CAPI (contrat d'amélioration des pratiques individuelles) project in France and the Quality and Outcome Framework in the UK
Enforcement	Regulations including those enforced by law, e.g.:
	• Compulsory generic substitution, e.g., Sweden – apart from an agreed limited number of situations
	• Compulsory INN prescribing, e.g., Abu Dhabi and Lithuania – apart from agreed products or situations
	• Prescribing restrictions, e.g., for patented statins in Austria, Finland, Norway and Sweden, patented PPIs in Norway, and angiotensin receptor blockers in Austria, Croatia and Sweden

INN: International non-proprietary name, ATC: Anatomical Therapeutic Chemical

aged entry of new drugs as well as improve the quality and efficiency of prescribing of established drugs.

New drugs

New medicines are of value when they improve health either because they are more effective, have less side-effects, or are easier to administer than current standards, and are seen as cost-effective.[2,3,17,31,76)] However, there can be conflicts between authorities and pharmaceutical companies with the former struggling to provide equitable and comprehensive healthcare when faced with continual resource pressures.[14,21,31,56,77-79)] Studies have suggested marketing costs can be as high as one third of a company's income,[31)] with companies spending US$53 billion (€40.2 billion) in the US alone in 2004 marketing to physicians.[31,80,81)] These conflicts can be greater when there are safety concerns with new drugs especially if they are likely to be prescribed in a wider population than those studied in randomized clinical trials.[31,82)]

New oral anticoagulants such as dabigatran illustrate some of these tensions as they show promise in the prevention of stroke in patients with atrial fibrillation, offering an alternative to warfarin without the need for International Normalised Ratio monitoring.[26,31,83-87)] However, there are safety concerns especially in the elderly.[26,31,83)] Safety concerns with dabigatran include potentially serious bleeding, blood clots and deaths in the elderly due to its low mean oral bioavailability, considerable variation in plasma drug concentrations, and the dependence on the kidneys for elimination of the active metabolite, complicated by no known antidote.[26,31,83,85,88-93)] These concerns resulted in a considerable range of activities pre- to post-launch among European countries to better manage its prescribing post launch,[31)] especially with concerns that the patient population in clinical practice is likely to be more elderly with greater co-morbidities than those in clinical trials.[82)] These activities also resulted in a proposed new model to optimise the managed entry of new premium priced drugs.[26,31)] These can be divided into three pillars - namely pre-, peri- and post-launch activities (Fig. 1).

Horizon scanning activities help identify new medicines which are expected to receive marketing authorisation from the Regulatory Authorities in the near future, and can include estimating their potential budget impact. Pre-launch assess-

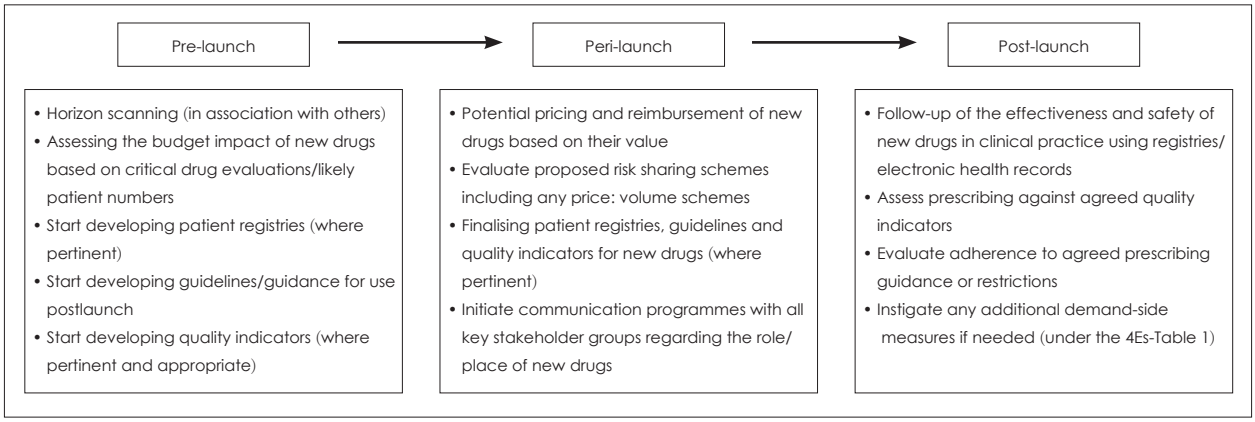

Fig. 1. Proposed model to optimise the managed entry of new drugs (adapted from references 25,26, and 31).

ments are undertaken by various national and regional health authorities in Europe up to three years before launch to prepare the authorities regarding possible new products.[25,26,94,95] Prioritisation of possible new medicines to concentrate on is typically based on their potential health benefit.[25] Information sources include the pharmaceutical industry, regulatory agencies, scientific literature, conference presentations, public media, clinical experts and other horizon scanning groups.[25] Forecasting of drug utilization and expenditure for both new and established drugs is increasingly used by national and regional health authorities in Europe to improve their planning for resource allocation given increasing pressures.[25,26,94] Standard drug treatments nearing the end of their patent life are of particular importance to authorities to help fund new premium priced drugs and/or increased volumes.[25,94]

Any new quality that indicators that are developed during pre- and peri-launch phases (Fig. 1) must have validity in terms of content, face, concurrence, construct and prediction to be of value.[26,96,97] Subsequently where pertinent, included in any new guidance/guidelines associated with new treatments, as well as potentially considered for inclusion in any ongoing financial incentive schemes for physicians.[26,33]

Multiple pre-launch activities to optimise the managed entry of dabigatran were illustrated by those undertaken by Stockholm County Council:[31]

• Systematic and long-term involvement of clinical and scientific expertise in the development of guidelines and advise to patients and prescribers through the Regional Drugs and Therapeutic Committee and clinical pharmacologists

• Extensive pre-launch activities including an appreciable number of meetings and training sessions with physician groups around key issues and concerns with dabigatran. In addition, published information for patients

• Forecasting the potential budget impact in 2011 and 2012 ahead of launch and monitoring this in practice

• Developing a laboratory method to monitor dabigatran levels in plasma, and recommending patient sampling post-launch

Post-launch activities for dabigatran included prescribing restrictions, e.g., Austria:[31]

• Ex ex-ante approval by the head physician of the patient's social health insurance fund before reimbursement of dabigatran; otherwise 100% co-payment (mirroring other situations)

• Renal function assessed and recorded prior to initiation treatment through determining Creatinine-Clearance (CrCl) levels to exclude patients with severe renal dysfunction (= CrCl <30 mL/min)

• Renal function assessed at least once a year in patients aged 75 or older, and/or in patients with compromised renal function

• In addition, regular monitoring of renal function if deterioration is expected, e.g., patients with hypovolaemia or dehydration and taking specific additional medications

European countries typically adopt different approaches to the pricing and reimbursement of new drugs. However, these approaches can be divided into countries where the potential reimbursed price is based on an assessment of the clinical gain versus current standards, e.g., Austria, France and Germany (Table 2). This subsequently drives reimbursed prices (Table 3).

Alternatively, authorities assess the health gain of new products versus current standards in terms of the number of incremental quality-adjusted life years (QALYs) gained. Subsequently, convert this into incremental cost/QALYs to aid reimbursement and funding deliberations, e.g., Ireland, Norway, Poland, Slovakia, Sweden and the United Kingdom in addition to Korea.[3,8,10,13,31,81,99-103] This can also include considerations of budget impact as seen in Korea and Poland.[8,10,103] The countries are further divided into those that give guidance on cost/QALY thresholds reflecting ongoing resource issues within the country and those that adopt a more humanistic

Table 2. Subdivisions of the health gain (benefit) of new products versus current standards in Austria, France and Germany[2,4,26,98]

Country	Subdivisions
Austria (3 subdivisions)	• Substantially added benefit
	• Added benefit
	• Marginal or similar benefit
France (5 subdivisions)	• ASMR I: Major improvement (new therapeutic area, reduction in mortality)
	• ASMR II: Significant improvement in efficacy and/or reduction of side-effects
	• ASMR III: Modest improvement in efficacy and/or reduction of side-effects
	• ASMR IV: Minor improvement
	• ASMR V: No or inadequate improvement
Germany (6 subdivisions)	• Substantial additional benefit
	• Considerable additional benefit
	• Small additional benefit
	• Un-quantifiable additional benefit
	• No additional benefit
	• Less benefit than current therapies

Table 3. Reimbursed prices for new products in Austria, France and Germany based on their perceived health gain (benefit) versus current standards[2,4,26,98]

Country	Potential reimbursed prices
Austria	• Substantially added benefit - average of prices among selected European countries with a pharmacoeconomic study required to justify the requested price
	• Added benefit - maximum of 10% above the price of current standards depending on population size (total population or sub-population)
	• Marginal or similar benefit - minimum of 10% below the price of current standards in Austria
France	• ASMR I/II/III - Based on prices of the new drug in selected European prices (Germany, Spain, Italy and the UK)
	• ASMR IV - typically similar prices to current standards in France (although can be higher if overall cost savings)
	• ASMR V - lower prices than current standards in France
Germany	• Either assigned to a pre-existing reference price group (typically limited or no added benefit)
	• Otherwise price negotiations between the Sickness Funds and manufacturer based on the level of health gain and prices in 15 European countries including any current discounts

approach with variable limits, based on issues such as disease severity and unmet need. Cost/QALY threshold levels include Euro 45000 (Ireland), Euro 18000 (Slovakia) and GB£30000 for the UK.[31,99,101,102] Countries with variable thresholds include Norway and Sweden.[3,13,81,100] However, typically the regions in these countries, who are the budget holders, further deliberate on the role and value of new drugs.[3,13] The deliberations include costs alongside issues such as the efficacy and safety of the new drug, the quality and level of evidence provided, as well as physician experience with both new and established drugs,[3,13,65] e.g., product considerations for the 'Wise List' in Stockholm County Council which is contained in Table 8.[13,65]

However even in the UK, cost/QALY thresholds act as guidance and new drugs have been funded at higher levels in disease areas of high unmet need and currently limited choices. This is illustrated by an analysis conducted by the Scottish Medicines Agency which showed:[25]

- Cost per QALY < £10 K - 79% 'yes to funding'
- Cost per QALY £10-20 K - 74% 'yes to funding'
- Cost per QALY £20-30 K - 55% 'yes to funding'
- Cost per QALY > £30 K - 29% 'yes to funding'

We see the number of risk sharing arrangements growing with ongoing pressures to reimburse new drugs alongside increasing budgetary concerns.[27-30,104] However, authorities need to consider a number of factors during their deliberations else there could be problems in practice. These include:[27,28,31]

- Appropriateness of the arrangement(s) for the situation/circumstances in the country/region
- Transparency of the objectives and scope of the proposal
- Actual novelty of the new drug
- Data ownership, i.e., health authority, company or both
- The extent of Health Informatic Systems already in place to monitor the agreement(s)/need for additional IT support
- Administrative burden of any proposed risk sharing scheme in relation to the potential overall savings
- Proportion health authorities will end up funding of any new drug's development costs (Phase IV)

Models are also being developed to enhance the co-ordination between hospitals and ambulatory care physicians to improve the rational use of medicine. This is because the prescription of new premium priced drugs is often initiated by specialists in hospitals, and pharmaceutical companies may offer attractive prices to hospitals to secure referrals.[105] These concerns have resulted in a number of activities to address this including:[105,106]

- In Austria, representatives from the Health Insurance Funds now sit on hospital Drug and Therapeutic Committee meetings as well as interact with hospital physicians
- A mutual list of recommended drugs in Scotland between ambulatory and hospital care among the Health Boards (regions). Typically, there is a requirement that prescriptions outside the list are endorsed by others before initiation
- Prescribing indicators are being developed for both new and established drugs in Catalonia (Spain). This is enhanced by an IT system that incorporates all sectors whereby GPs can debate and challenge specialist prescribing if the drug prescribed is outside recommended guidance
- The 'Wise List' in Stockholm County Council, which also includes a separate list for hospital outpatient departments. Robust systems for developing these lists results in high adherence - over 77% of all prescriptions in ambulatory care

Established drugs

Measures to obtain low prices for generics

European countries have different approaches to the pricing of generics with each member state free to set their own policies. This has resulted in considerably price differences.[5,6,15,57] For instance in France, initially generics only have to be priced 55% below the pre-patent loss price mirroring the high prices seen in Korea.[2,5,6,21] However in some European, prices can be as low as 2% to 5% of pre-patent loss prices, e.g., Netherlands, Sweden and UK (Table 4). Population size is not a barrier to low prices for generics as seen in Lithuania (Table 4) and the Republic of Srpska dispelling such myths.[5,6,18,76]

Measures to enhance the utilisation of generics versus originators

A range of activities were instigated in Austria, France and Portugal to increase the utilisation of generics through addressing concerns including the effectiveness and safety of generics (Table 5). Other initiatives include measures to increase INN prescribing rates, e.g., Lithuania and the UK (Table 4, 5).

Measures to enhance the utilisation of generics versus patented products in a class

Multiple demand-side measures (Table 1), coupled with measures to obtain low prices for generics (Table 4, 5), appreciably enhanced prescribing efficiency for the PPIs, statins and renin-angiotensin inhibitor drugs in the Netherlands, Scotland and Sweden (Table 6), where all the drugs in the class are seen as essentially similar in all or nearly all patients.

The findings in Table 6, especially when comparing Sweden and Ireland for the PPIs and statins, corroborate other studies that multiple interventions are needed to influence physician prescribing habits.[109,110] A similar situation is seen with the implementation of guidelines.[111] Recent findings regarding the utilisation of losartan post generic availability further supports this. There was no change in the utilisation of losartan versus patented ARBs in Scotland following generics despite general measures to increase the prescribing of generics versus patented products (Table 5, 6).[48,49,62] A similar situation was seen in one English primary care organisation before multiple measures were instigated to significantly enhance the utilisation of losartan.[6,112] These included educational initiatives, therapeutic switching programmes, indicators and financial incentives.[112] Similar multiple demand-side measures in Sweden also appreciably enhanced the utilisation of losartan versus other ARBs post generics.[64]

As mentioned, prescribing restrictions limiting the prescribing of patented products in a class versus generics have been introduced in a number of countries. These include the statins in Austria, Finland, Norway and Sweden,[12,14,50,51,53,107] esomeprazole in Norway,[50,51] and ARBs versus ACEIs in Austria, Croatia, Lithuania, the Republic of Srpska and the Sweden.[18,48,50,72,76,113] Prescribing restrictions have also recently been introduced for duloxetine in Sweden.[54] However, analysis of the findings from the various studies has again shown that the intensity of the follow-up will appreciably influence their impact as seen by:

- Greater influence of prescribing restrictions for patented statins in Austria versus Norway, with patients in Austria needing the permission of the chief medical officer of their health insurance company that they have failed to reached target lipid levels with a generic statin. Otherwise 100% co-payment. No such regulations existed in Norway[51,107]
- Greater impact on prescribing restrictions for ARBs in Croatia and the Republic of Srpska versus Austria with greater follow-up of patients and physicians.[6,48,50,76] This included access to patient histories in Croatia to check the criteria for prescribing with possibly financial penalties for continued abuse of the restrictions[48]
- Limited influence of prescribing restrictions for esomeprazole in Norway as specialists have to verify the diagnosis and recommend therapy before PPIs can be prescribed and reimbursed in the community, and they are not subject to the same restrictions. In addition, GPs may be reluctant to alter

the recommendations of specialists[50,51]

However, there can be difficulties with introducing prescribing restrictions in some classes such as patients with mental health problems. This is because of the recognised need to tailor treatments to maximise patient outcomes.[54,114,115] Consequently, care is needed alongside realistic expectations.

Timing of introducing prescribing restrictions is also important. There was limited impact of the recent restrictions for patented statins in Sweden limiting them to second line on their subsequent utilisation.[53] This was in direct contrast

Table 4. Measures to obtain low prices of generics in Lithuania, the Netherlands, Sweden and the United Kingdom

Country	Measures introduced and their impact on generic prices
Lithuania[18]	• Compulsory International Non-proprietary Name (INN) prescribing. The only exceptions are when a physician receives prior approval from the Hospital or Polyclinic Therapeutic Committee; alternatively for biological products • The cheapest molecule establishes the reference price, with patients required to fund the additional costs themselves for a more expensive product • Financial and other sanctions for pharmacists for not stocking and providing information to patients regarding the cheapest generic • This resulted in: - Generic simvastatin in 2009 was 83% below the 2000 originator price, the first year of generic availability, mirroring price reductions in other European countries - Generic ACEI inhibitors in 2009 were up to 65% below 2001 originator prices, similar to price reductions in other European countries - Generic SSRIs in 2009 were up to 73% below 2001 originator prices, again similar to price reductions in other European countries
Netherlands[6,46]	• A preference pricing policy was instigated in 2008 whereby only the cheapest generics would be reimbursed, with patients covering the costs for a non-preferred drug • Tenders were subsequently conducted for high volume generics to achieve low prices. This resulted in: - Appreciable price reductions of between 76% to 93% for the 10 largest generics by volume - Extension of the scheme in 2009 as more generics became available - Both generic omeprazole and generic simvastatin in 2010 were just 2% of originator pre-patent loss prices (expenditure/DDD)
Sweden[5,6,13]	• Compulsory generic substitution – resulting in generic prices falling on average of 40% by the end of 2005 compared with 2002 • Prices for high-volume generics were 4% to 13% of originator pre-patent loss prices by 2009 • More recently: - All pharmacies are obligated to offer patients the cheapest molecule currently on the market (ATC Level 5) when there are substitutable generic medicines available - There are regular monthly auctions for generics in Sweden, with the manufacturer with the lowest price wining the auction. However, they must be able to supply the whole market for the entire period (typically 70% to 80% of sales during the period) - Expected savings from the tendering process are estimated at 8 billion SEK/year from 2011 onwards
United Kingdom[5,6,14,15,49,70]	• 'M' and 'W' (Manufacturer and Wholesaler) scheme was introduced in the UK in 2005. This resulted in increasing transparency in the pricing of generics, as well as discounts and rebates offered by manufacturers to community pharmacists to preferentially dispense their generic • This coupled with high INN prescribing rates (Table 6) led to: - An average 32.4% reduction in the prices of generics within the first year of introduction. Prior to this, some generic manufacturers were offering discounts of up to 80% or more to community pharmacists to preferentially dispense their particular generic - Reimbursed prices and expenditure/defined daily dose for generic simvastatin just 2% to 3% of pre-patent loss originator prices

ACEI: angiotensin converting enzyme inhibitor, ATC: Anatomical Therapeutic Chemical, DDD: defined daily dose, SSRI: selective serotonin re-uptake inhibitor

Table 5. Initiatives in Austria, France, Portugal and the UK to enhance the utilisation of generics versus originators

Country	Initiative
Austria[106,107]	• Physicians: - Training courses for new physicians run by the Health Insurance Funds including discussions on generics - Agreements with Physician Associations to increase the prescribing of generics - Benchmarking and communicating information on the prescribing of generics between physicians - Regular information on potential savings from generics versus originators - Financial incentives to enhance the prescribing of generics • Patients: - Information campaigns to patients including media, posters, leaflets, health journals and letters regarding generics
France[2,5,6,26,108]	• Physicians: - Authorities regularly publishing the list of available generic products - Benchmarking ambulatory care physicians on their generic prescribing rates and providing feedback - Pay for Performance (P4P) schemes including incentives to enhance the prescribing of generic drugs first line compared with patented drugs in a class/therapeutic area - Academic detailing activities by physicians employed by the National Health Insurance Fund • Pharmacists: - Guaranteed the same absolute margin for both generic and originator medicines - Annual substitution targets linked with their payment structure • Patients: - Government promotional campaigns enhancing the acceptance of generics and INN prescribing - Promotion of generics on the back of reimbursement forms sent by the National Health Insurance Fund to patients - Patients must pay the Health Insurance proportion of the cost of a drug if they refuse substitution and subsequently can claim this back. However, pharmacists cover these costs if patients accept substitution and subsequently claim the amount back from the National Health Insurance Fund These measures, coupled with a prescriptive pricing policy for generics, led to annual savings estimated at €1bn in 2007, €0.905 bn in 2008 and €1.01 bn in 2009
Portugal[6]	• Advertising campaigns promoting generics to all key stakeholder groups including physicians and patients • Increasing IT support - including electronic medical prescribing tools • Information given to the patient in the prescription about the amount that could be saved if the doctor chose the cheapest medicine for the condition • Increasing patient co-payments thereby making generics more attractive As a result, the generic market in Portugal expanded by 16% January to October 2011, with costs decreasing by 12% during this period
United Kingdom[5,6,12,48,49]	• Physicians typically trained in medical schools to prescribe by INN name with follow-up in the community helped by IT systems • Follow-up includes decision support software as well as monitoring the prescribing of generics, which is seen as good-quality prescribing • The various initiatives have resulted in high INN prescribing rates averaging over 80% across all products, rising to over 98% for a number of generics • These include (by volume of the total drug dispensed on a defined daily dose basis): - PPI - omeprazole 98% - Statins - simvastatin 98% - ACEIs - enalapril 99%, lisinopril 98% - ARBs - losartan 99% - Selective serotonin reuptake inhibitors (SSRIs) - fluoxetine 98%, sertraline 98%, citalopram 99% - Atypical antipsychotic drugs - risperidone 98%

INN: International non-proprietary name, ACEI: angiotensin converting enzyme inhibitor, PPI: proton pump inhibitor, ARB: angiotensin receptor blocker

Table 6. Measures to enhance the prescribing of generics versus patented drugs in high volume classes and their outcome

Country	Class	Influence of multiple measures
Netherlands[6,46]	PPIs	• Multiple demand-side measures increased the prescribing of generic omeprazole • This, coupled with measures to lower generic prices, led to reimbursed expenditure for the PPIs falling by 58% in 2010 vs. 2000 in the Netherlands • This was despite a 3 fold increase in utilisation during this period
	Statins	• Similarly multiple demand-side measures increased the prescribing of generic simvastatin • This, coupled with measures to lower generic prices, led to reimbursed expenditure for the statins falling by 14% in 2010 vs. 2000 in the Netherlands despite a 3.8 fold increase in utilisation
Sweden[12,13]	PPIs	• Multiple demand side measures appreciably increased the prescribing of omeprazole in Sweden once generics became available, with stable and low utilisation of esomeprazole • This, combined with the measures to lower the prices of generics in Sweden, resulted in reimbursed expenditure for the PPIs decreasing by 49% in 2007 vs. 2001 despite utilisation increasing by 53% during this period • As a result, reimbursed expenditure (Euros/1000 inhabitants/year) in 2007 was less than one-tenth of the expenditure in Ireland with its increased prescribing of esomeprazole following the launch of generic omeprazole due to limited demand side measures to combat company activities (although more co-morbid population)
	Statins	• Again multiple demand-side measures increased the prescribing of generic simvastatin once available • This, combined with measures to lower generic prices, led to a 39% reduction in statin expenditure in 2007 vs. 2001 in Sweden despite a 3.2 fold increase in utilisation during this period • Again, reimbursed expenditure (Euros/1000 inhabitants/year) in Sweden was less than one-tenth of that in Ireland in 2007 with its increased utilisation of atorvastatin and rosuvastatin following generic simvastatin as again limited demand-side measures to combat company activities (although more co-morbid population)
UK[48,49]	PPIs	• Multiple demand-side measures in Scotland encouraging the prescribing of generic omeprazole, coupled with measures to lower generic prices, resulted in expenditure for the PPIs in 2010 56% below 2001 levels despite a 3 fold increase in utilisation • Estimated that expenditure on the PPIs in Scotland would have been GB£159 million per year greater in 2010 for a population of 5.2 million - assuming similar utilisation patterns and costs kept at pre-patent loss prices
	Statins	• Multiple demand-side measures to encourage the prescribing of generic simvastatin, coupled with measures to lower generic prices, resulted in expenditure for the statins in 2010 in Scotland only 7% above 2001 levels despite a 6.2 fold increase in utilisation • Estimated that expenditure for the statins would have been GB£290 million per year greater in 2010 in Scotland - again assuming similar overall utilisation patterns and costs kept the same as the pre-patent loss situation
	Renin-angiotensin inhibitor drugs	• Demand side measures limiting the prescribing of ARBs, coupled with measures to lower generic ACEI prices, kept expenditure on renin-angiotensin inhibitor drugs in Scotland relatively stable between 2001 and 2007 • This was despite volumes increasing by 159% during this period • There was a similar influence of multiple demand-side measures on limiting the prescribing of ARBs in Scotland to that seen in Austria and Croatia where prescribing restrictions were introduced. As a result, provide an example to countries unable to introduce such restrictions

PPIs: proton pump inhibitors, ACEIs: angiotensin converting enzyme inhibitors, ARBs: angiotensin receptor blockers

to the findings in Austria.[107] This may be due to timing, with the prescribing restrictions in Sweden introduced some six years after multiple activities by the counties (regions) to enhance the utilisation of generic versus patented statins (Table 6).[13,53]

The research has also shown that care is needed when seeking to delist products from current reimbursement lists if this results in very limited choices. In Germany, atorvastatin was delisted when all the statins were included in one reference class as there was no perceived difference in their effectiveness. The company did not want to lower the price of atorvastatin to that of generic simvastatin, resulting in its removal from the reimbursement list.[55] However, this led to appreciable expenditure on ezetimibe despite continuing controversy regarding its effectiveness.[55] Adopting a similar approach to Austria and restricting the prescribing of atorvastatin to second line may have prevented this through providing a choice.

Finally, European countries have also introduced a number of measures to limit industry activities to help enhance pre-

Table 7. Examples of activities among European countries to limit commercial activities

Country	Activity
Croatia[48,116]	• Curbing of pharmaceutical company activities through the reporting of all promotional expenses as well as financial remuneration to physicians for prescribing • Limiting the contact between company representatives and physicians • Enforcement of pharmaceutical company activities is enhanced by a financial deposit from companies with penalties for abuse • Alongside this, potential delisting of products as well as 'naming and shaming' offending companies in public
Lithuania[18]	• As seen in Table 4, all prescriptions must be written by International non-proprietary name, except biological products, unless the physician receives prior approval from the Hospital or Polyclinic Therapeutic Committee • In addition, pharmacists must provide pricing information to patients on a computer screen, and dispense the cheapest generic. Failure to comply leads to an initial fine of 100 Ltk (€30) • Further abuse results in the pharmacy no longer able to dispense prescriptions on behalf of the Lithuanian Health Insurance Agency, which appreciably reduces their income
Sweden[3,5,6,13]	• Compulsory instigation of regional Drugs and Therapeutic Committees since 1997. This resulted in for instance the 'Wise List' in Stockholm County Council • National agreements between the Swedish Association of Pharmaceutical Industries, SALAR and the Swedish Medical Association limiting contact with physicians and other health care professionals • The ethical code was revised in 2007 – now funding for physicians for travel and accommodation to International meetings is divided equally between county councils (regions) and pharmaceutical companies • In addition, physicians need their participation in such International meetings agreed by their head of department with their salary fully covered by the county (region)

Table 8. Key drug selection criteria as well as critical questions when considering new drugs in the Wise List[13,65]

Key criteria for drug selection	Key questions when reviewing the inclusion of new drugs
• Efficacy and safety - based on available evidence preferably including data from randomised controlled trials • Pharmaceutical suitability - formulations, strengths, and pharmacokinetic properties • Efficiency - principally based on reimbursed prices and overall budget impact • Experience - mainly concerned with drug safety - recommended drugs should generally have been available for at least two years • Environmental aspects - if drugs are considered similar environmental considerations can guide choices	• What was the main scientific question posed? • What patients were included in the control groups and what type of study was conducted • Was it double-blinded, single-blinded, etc.? • How was the randomisation conducted? • What about concomitant medications? • Are the drug effects well defined, relevant, etc.? • What about adverse events, are these well studied, described, etc.? • How appropriate was the statistical design? • What about the conclusions of the studies - were these adequate, doubtful, irrelevant?

scribing efficiency. These include Croatia, Lithuania and Sweden (Table 7).

Similar activities are ongoing in Korea to reduce illegal promotional activities, e.g., the 'Dual Punishment System'.[21] The new law appears to be working with 23092 physicians, 130 pharmaceutical companies and 221 wholesalers detected and punished for illegal activities in the two years since its introduction, as well as price reductions of kickback-related drugs amounting to annual savings of US$48 million.[21]

Measures to increase the quality of prescribing of established drugs

These include the development of an essential medical list as well as quality indicators. The former includes the 'Wise List' in Stockholm, Sweden (Table 8), with knowledge that inappropriate use of drugs can increase adverse drug reactions, morbidity and mortality as well as wasting resources.[65] The latter includes the Quality and Outcome Framework (QoF) in the UK.[49,70,74,75]

The 'Wise List' was designed knowing that multifaceted contextualized methods are needed to enhance adherence to drug recommendations including professional ownership. A key principle for drug selection was including only well documented and cost-effective drugs (Table 8), as well as strong conflict-of-interest criteria.[13,65,105]

The 'Wise List' includes approximately 200 substances giving first and second line choices for diseases typically seen in ambulatory care.[65] Overall adherence was 77% among all providers in 2009, up from 69% in 1999, with adherence as high as 87% among the 209 Primary Healthcare Centres in Stockholm.[65] We believe the high rates to this voluntary list were achieved by clear principles for drug recommendations (Table 8), involvement of medical opinion leaders, educational activities as well as comprehensive communication strategies among all key stakeholder groups enhanced by easy access to the 'Wise List' at point-of-care.[65,105]

Other examples of combined approaches include guidelines produced by Scottish Intercollegiate Guideline Network in Scotland. All major stakeholder groups are involved, with the emphasis on local ownership and implementation. As a consequence, providers of care in Scotland are expected to follow the guidance, and give justifications if their standard of care differs appreciably from this.[48,49] This compares with guideline overload in France among ambulatory care physicians where 243 guidelines had been issued by 1999, leading to their limited use in practice and subsequent demise.[2,117] This was not helped by limited follow-up of physician adherence in practice.[2]

The QoF in the UK was introduced in the UK in 2004 to increase family practitioners' income depending on their performance.[74,75] As a result, improve the quality and consistency of care in target disease areas. Overall, there were146 quality indicators relating to clinical care for 10 chronic diseases, organization of care, and patient experiences. For the clinical indicators, practices claimed points that generated payments according to the proportion of patients who achieve each target.[74,75] Those relating to hypercholesterolaemia and hypertension are contained in Table 9.

Table 9. Quality and Outcome Framework (QoF) targets for patients with hypercholesterolaemia and hypertension[48,49,70,75]

Disease area	Targets
Hypercholesterolaemia	• Practice indicators include: - Practices producing a register of patients with coronary artery disease (CHD), stroke, and diabetes - The % of patients with CHD, stroke and diabetes whose notes have a record total cholesterol levels within the past 15 months • Specific QoF indicators include: - The percentage of patients with CHD whose last measured total cholesterol (measured in the last 15 months) is 5 mmol/L or less - The percentage of patients with CHD prescribed a statin - The percentage of patients with transient ischaemic attack or stroke whose last measured total cholesterol (measured in the last 15 months) is 5 mmol/L or less - The percentage of patients with diabetes whose last measured total cholesterol within previous 15 months is 5 or less
Hypertension	• Specific QoF indicators include: - The percentage of patients with coronary heart disease whose last blood pressure measurement (within the previous15 months) was 150/90 mm Hg or less - The percentage of patients with diabetes whose last blood pressure measurement was 145/85 mm Hg or less - The percentage of patients with hypertension in whom the last blood pressure measurement (within the previous 9 months) was 150/90 mm Hg or less

We believe the QoF targets for patients with hypercholesterolaemia (Table 9), combined with recent publications, increased the prescribing of higher strength statins in the UK. In Scotland, higher strength simvastatin (40 and 80 mg) accounted for 85% of total simvastatin DDDs in 2010; slightly greater for higher strength atorvastatin (20, 40 and 80 mgs) at 94% of total atorvastatin DDDs.[49] This was nearly all 40 mg tablets for simvastatin.[49] A similar situation was seen in North Lancashire Primary Care Trust.[70] In comparison, the average dispensed dose of simvastatin in Stockholm, Sweden, in 2008 was only 20.4 mg, with 35% were dispensed 10 mg and only 25% higher strength simvastatin.[13] The prescribed dose of simvastatin for secondary prevention patients in Ireland also averaged a similar dose at only 22 mg,[118] with physicians in both countries having access to the same published literature. However, it is difficult to substantiate this without further specific research. We also believe the QoF targets to identify and treat patients with hypertension (Table 9) appreciably enhanced the prescribing of renin-angiotensin inhibitor drugs in Scotland, e.g., there was a 159% increase in their utilisation in Scotland between 2001 and 2007 versus 69% in Austria, 72% in Portugal and 92% in Sweden.[48,49] However, again we cannot fully substantiate this without access to specific patient data.

Discussion

A number of activities have been undertaken across Europe to enhance the quality and efficiency of prescribing for both new and established drugs. Recent reforms in Korea mirror some of these.

However, we believe authorities in Europe can provide some guidance as the authorities in Korea as they seek to further enhance their prescribing efficiency. These include the instigation of pro-active measures to optimise the managed entry of new drugs including tightening of pricing and reimbursement regulations for new products as well as policies to further lower the price of generics and enhance their utilisation. In addition, potential measures to enhance the quality of care.

The proposed model to optimise the managed entry of new drugs (Fig. 1) can provide a basis for the authorities in Korea. This is because there are over 1300 drugs in development among companies listed in the NASDAQ Biotech Index, of which over 40% are new biological drugs.[33,119] The majority of which are for cancer or immunological diseases, and likely to be associated with high requested prices.[31,32,34,35] The independent French Drug Information publication - Prescrire - believed though only 0% to 5% of new products were major advances each year during the past decade, and only 3% to 13% advances.[120] Consequently, there appear to be opportunities for countries to look more critically at the value of new drugs, and reflect this in their reimbursed prices including discounts or rebates. Alongside this, improve their overall planning for the launch of new drugs including improved interface management between hospital and ambulatory care to conserve resources.[26,31,94,95,105]

Lithuania and the UK provide guidance on potential ways to enhance the use of generics as well as obtain low prices. This through increased transparency in the system between manufacturers, wholesalers, pharmacists and the health authorities (Table 4, 5, 7). The preference price model in the Netherlands and monthly auctions in Sweden, coupled with compulsory generic substitution (Table 4), also provide guidance. However, care is needed when introducing tendering models. In Denmark, companies have to offer their lowest prices every two weeks with only the cheapest medicine fully reimbursed. This though has attracted companies who specialize in offering limited numbers of generic medicines at the lowest price, driving out companies offering a broad range of medicines.[73,121] However, Sweden does not appear to be encountering these problems with their monthly rather than two-weekly auctions, although the situation is still being monitored.[5,6]

We believe the high INN prescribing rates in the UK (Table 5) reduces patient confusion once multiple sources are available. Confusion is enhanced if patients are dispensed different branded generics on each occasion without explanation. This can happen in Sweden following compulsory generic substitution and the recent instigation of regular monthly auctions for generics with only limited time spent with patients (Table 4).[5,6,13,122,123]

Confusion, compounded by the lack of an explanation, can potentially lead to either duplication or patients not taking their prescribed treatments as directed.[13,122,123] Ways to address this is include INN prescribing apart from a limited number of well-known situations, which has worked well in the UK (Table 5). However, authorities need to ensure that all factors are in place when introducing INN prescribing else there may be disappointment. These include ensuring pharmacists are unable to dispense either originator or branded generic and be fully reimbursed as well as ensure measures are in place to enhance the prescribing of generics versus patented products. The authorities in Abu Dhabi did neither of these. As a result, there was continued dispensing of originator simvastatin despite compulsory INN prescribing and increased prescribing of patented rather than multiple sourced products in the class. This resulted in increased rather than deceased expenditure for both the PPIs and statins following compulsory INN prescribing.[71]

We believe the various measures introduced in the Neth-

erlands, Scotland and Sweden for the various classes (Table 1, 4, 5, 6, 8) give guidance on potential measures for Korea. Care is not compromised as the PPIs, statins and renin-angiotensin inhibitor products are seen as similar in all or nearly all patients,[5,6,12,48,62-64] endorsed by successful therapeutic switching programmes in Norway, Sweden and the UK.[49,63,64,70,112,124] The various measures in the UK helped ensure no increased costs for the renin-angiotensin inhibitor products or statins following the instigation of the QoF despite appreciably increased utilisation (Table 8, 9). The various studies also showed that the authorities cannot rely on a 'spill over' effect between classes to affect future physician prescribing habits, and multiple demand-side measures are needed. Active follow-up is also needed when introducing prescribing restrictions else authorities may be disappointed in the outcome. Finally, we believe the Wise List concept provides a basis for enhancing rational prescribing especially where there are concerns with multiple drug choices available to physicians and limited knowledge of some of these.

Conclusions

We have provided details of ongoing reforms across Europe to enhance the quality and efficiency of prescribing of both new and established products and their influence. We hope by doing so that we have stimulated debate among the various stakeholder groups in Korea regarding potential measures to consider to further enhance their prescribing efficiency and thereby the sustainability of their healthcare system.

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