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PROGRAMME

Research Brief

**Inappropriate prescribing
of medicines –
Implications for older people
and health budgets**

Key statistics – ROI

- At the 2006 census, there were 468,000 people aged 65+ (11% of the population).
- By 2041, there will be 1.4 million aged 65 and over (22% of the population).
- Life expectancy at birth is 76.8 years for men and 81.6 years for women.
- 95% of men and women aged 70 and over rate their health as very good (19%), good (50%) or fair (26%).
- 4.8% of people aged 65 and over are in residential care.

Key statistics – NI

- In 2008, there were 248,500 people aged 65+ (14% of the population).
- In 2041 the 65+ age group is projected to make up 24% of the population.
- Life expectancy is 76.3 years for men and 81.3 years for women.
- 66% of people aged 70 and over rate their health as good (25%) or fairly good (42%).
- 3.9% of people aged 65 and over are in residential care.

Policy context – ROI

- The HIQA document *National Quality Standards for Residential Care Settings for Older People in Ireland* includes several standards that are related to medicines and medication monitoring.
- *Primary Care: A new direction* is the government strategy on primary care. It states that patients treated by doctors other than their regular GPs are more likely to be prescribed medication.
- *Quality and Fairness* (2001) is the government strategy for healthcare but does not mention inappropriate prescribing. It refers to the Medicinal Products (Prescriptions and Control of Supply) Regulations, 1996–2000.

Policy context – NI

- The NI Medicines Governance Team is responsible for tasks such as promoting the reporting of medicine incidents, the analysis of these reports, spreading good practice and developing risk management.
- The DHSSPS document *Enhancing Primary and Community Care: Non-Medical Prescribing* aims to avoid adverse incidents in prescribing medication to older people.
- In addition, *The Quality standards for Health and Social care* (also published by DHSSPS) encourage safe practice with regard to medication.

Inappropriate prescribing of medicines – Implications for older people and health budgets

Introduction

Inappropriate prescribing of medicines, where the risks are greater than the potential benefits, is receiving growing attention from researchers and policy-makers – for two main reasons. One is possible adverse drug effects among people receiving the medicines, many of them older people: these are linked with higher mortality, morbidity and healthcare utilisation (Hamilton et al, 2009).

Another reason is the growing cost of healthcare. Not only is money often spent on unnecessary medicines but the cost to health services is greatly increased if patients experience adverse reactions, such as falls and fractures. Reducing inappropriate prescribing can therefore bring gains to the health of older people while also saving money.

This briefing is in three parts. The first sets the context; the second draws on a research report by Byrne et al (2011), funded under Call 2 of CARDI's research grants programme; the third summarises the policy implications.

Key findings

- In the Republic of Ireland older people use four times more medicine than other age groups. Elsewhere in Europe older age groups take 2.3 times more (Barry et al, 2006).
- One-third of older people presenting to hospital in ROI and 21% of those living at home are taking potentially inappropriate medicine (Ryan et al, 2009).¹
- The median number of medicines prescribed for older people in nursing homes was 11. Half of them were being prescribed 8–14 daily medicines each (Patterson et al, 2010; Byrne et al, 2011).
- In ROI, approximately 13% of all prescribed medicines for nursing home residents were potentially inappropriate. 73% of residents were prescribed one or more of these medicines in ROI and 67% were prescribed one or more of these in NI. (Byrne et al, 2011).²
- In ROI 16.5% and in NI 21.9% of residents had three or more instances of potentially inappropriate prescribing (Byrne et al, 2011).
- The cost of inappropriate medicines for the 630 residents, both in NI and ROI reviewed in the Byrne research was €165,513 per annum (Byrne et al, 2011).
- The upper projection is that the number of prescriptions in ROI will double from 55 million in 2006 to 110 million by 2021 (Bennett et al, 2009).

¹ A potentially inappropriate medication (PIM) is a medication which possesses an unfavourable risk-benefit ratio i.e. a medication for which the risks associated with using a particular medication outweigh the benefits of using said medication, especially when there are effective, safer alternatives available. The term potential is important as in some cases the prescriber may have considered alternative therapies but for a reason unknown to the researcher may have chosen to proceed with a given course of treatment (Byrne et al, 2011:8).

² The medicines were identified as potentially inappropriate but patients were not followed up to see if any drug related adverse event occurred e.g. constipation.

Context

Older people have higher rates of co-morbidities (two or more illnesses) than younger individuals and are therefore more likely to be prescribed multiple concurrent medications. Research in Europe indicates that people aged 65+ as a whole take 2.3 times more medication than younger people (Barry *et al*, 2006). In ROI older people make up 11.5% of the population but consume 47% of all the prescribed medications (Barry *et al*, 2006). In Ireland, North and South, the population of older people is projected to increase rapidly in coming decades. This has obvious and important implications for the consumption and cost of medicines as well as for the provision of long-term care facilities to cater for those who cannot live at home.

Figure 1: NI projected rise in older population 2006-2041 (thousands)

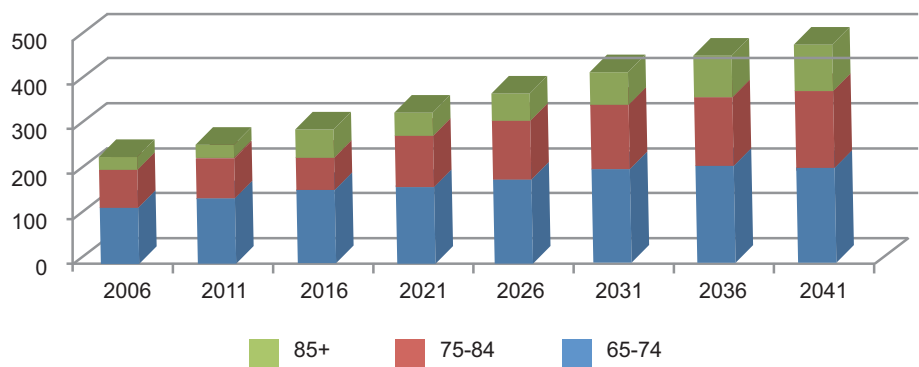
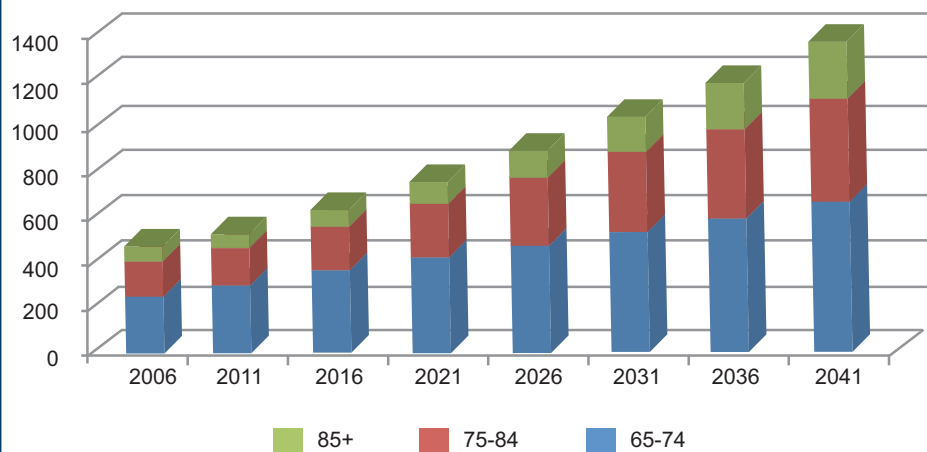


Figure 2: RoI projected rise in older population 2006-2041 (thousands)



Policy and cost

Inappropriate prescribing can have serious consequences. In the UK, for example, the National Patient Safety Agency (NPSA) estimates the annual cost to the National Health Service of harmful medication as nearly £800 million. It says that 5% of non-elective hospital admissions are due to adverse effects of drugs and that this is especially important in frail older people and patients on multiple medications.

Recent research in Cork University Hospital indicates that adverse drug reactions and adverse drug events account for 6% of all emergency admissions of older patients (Hamilton *et al.* 2011).

Across the NHS in 2006, 40,000 medication errors were reported, with 36 deaths and 2,000 cases of severe harm among people of all ages (cited in DHSSPS, 2010a). One example of adverse events can be seen in benzodiazepines (sedatives such as diazepam). The most commonly encountered instance of potentially inappropriate prescribing in both NI and ROI nursing home residents related to the prescribing of benzodiazepines in the study funded by CARDI (Byrne *et al.* 2011). These were the subject of a recent report by the Health Research Board in ROI (Bellerose *et al.* 2010). It stated that:

In the period 2003–2008 the annual number of treated cases reporting a benzodiazepine as a problem substance increased by just over 63%, from 1,054 in 2003 to 1,719 in 2008. In addition, in 1998–2007, benzodiazepines were implicated in nearly one-third (31%) of all deaths by poisoning, with the annual number increasing from 65 in 1998 to 88 in 2007.

The number of items prescribed under the General Medical Services (medical card) scheme alone more than doubled from 20 million to 44 million in the decade to 2007. Overall, prescriptions rose from about 55 million in 2006 to more than 70 million in 2009 (DoHC, 2010). Research by the Economic and Social Research Institute projects that factors such as the ageing population mean that the number of prescribed items could rise to 110 million by 2021, at an ingredient cost that could go as high as €2.4 billion (Bennett *et al.* 2009).

Table 1**NI care packages for people aged 65+ in residential or nursing home care, 2010**

Health and Social Care Trust	Number
Belfast	2302
Northern	2377
South Eastern	2053
Southern	1611
Western	1334
Northern Ireland	9677

Source DHSSPS.

Table 2**RoI long-term care residents aged 65+ by HSE region, 2006**

HSE region	Number
Dublin North East	4414
Dublin Mid-Leinster	5229
Southern	6302
Western	6555
Republic of Ireland	22,500

Source: Layte, R et al (2009).

Evaluation of inappropriate prescribing in long-stay elderly facilities

Dr Stephen Byrne and colleagues undertook research to quantify rates of potentially inappropriate medicines (PIMs) in a random selection of older residents in long-term care in greater Cork and compared the findings with a recently completed study in Northern Ireland (Patterson et al, 2010).³

Extent of medicine use

The North and South studies resulted in datasets of 315 older people in each place matched precisely by age and sex. The median age was 84, ranging from 65 to 99; and half of the 630 older people were aged from 78 to 89.

³ Researchers at University College Cork have developed a tool to assess the extent of inappropriate prescribing, Screening Tool for Older Person's Prescriptions (STOPP), which is appropriate for Ireland, north and south (Gallagher et al, 2008). The figures quoted in this briefing are based on the STOPP criteria but the full research report also uses the Beers criteria, which were developed in the USA.

In total, 3,730 medicines were prescribed for the ROI residents and 3,394 for those in NI. The median number of medicines per resident was 11 in ROI and 10 in NI. In ROI half the patients were prescribed between 9 and 14 medicines but in an extreme case one resident was prescribed 25 medicines. Similarly, in NI half of the patients were prescribed between 7 and 13 medicines, with one extreme case of an older person prescribed 26 medicines. The study considered only prescribed medications and did not include any obtained over-the-counter, since long term care residents do not, as a matter of practice, receive OTC medicines.

Interestingly, the oldest residents (those over 90) were not the ones taking the greatest number of medicines. People aged 80–84 were most frequently prescribed (12 medicines daily in ROI and 10 medicines daily in NI), while the people aged 90–94 were on average prescribed 10 medicines daily in ROI and nine medicines daily in the NI sample. The decline in medication use among the oldest old was statistically significant. As expected, residents with co-morbidities (more than one illness) had somewhat higher than average medicine consumption.

What is inappropriate prescribing (IP)?

Appropriate prescribing covers a range of different prescribing values and practices and takes account of factors such as:

- what the patient wants;
- what the patient needs;
- scientific rationalism (including the clinical pharmacology of certain drugs).

In the case of older people, prescribing practice should take account of the life expectancy of the patient; the correct therapeutic approach in patients with poor prognosis; and selection of a pharmacotherapy with the lowest risk.

IP is the use of a medicine (of all forms, e.g. pills) for which the risks are greater than the potential benefits, especially when there are effective, safer alternatives to treat the same condition. IP can mean different things:

- over-prescribing of medicine (polypharmacy);
- higher doses or frequencies than are clinically indicated;
- drugs whose risks of an adverse reaction outweigh the clinical benefits;
- medicine with high inherent risk of adverse drug-drug or drug-disease interactions;
- drugs that are not clinically beneficial for a specific patient or for which a more effective agent is available;
- medicine that is likely to exacerbate a clinical problem in older people e.g. benzodiazepines for patients with a history of falls;
- failure to prescribe, or under-prescription of, a clinically beneficial medication to a patient for whom there is no valid reason not to give it.

(Byrne et al, 2011: 6–7)

How much is inappropriate?

Between two-thirds and three-quarters of the older people in the study were prescribed at least one potentially inappropriate medicine (PIMs): 67% in the NI nursing homes and 73% of the ROI older people. A total of 121 (19.2%) patients had three or more instances of potentially inappropriate prescribing, nearly one-fifth of the total numbers in the dataset. Almost one thousand (920) of all the medicines prescribed were potentially inappropriate. In ROI men were more likely to be given PIMs (78.5%) than women (71.2%) but female residents were slightly more likely to be given two or more PIMs in both ROI and NI.

A significant correlation was found both North and South between the number of medicines prescribed and the occurrence of IP. In other words, people getting more medicines were more likely to be receiving inappropriate treatments. There was also a significant relationship between being on more than five medicines (the internationally accepted standard of polypharmacy) and the rate of PIMs.

Benzodiazepines were the most commonly encountered potentially inappropriately prescribed medication. However, inappropriate prescribing of these sedatives in older patients has been highlighted in research for the last 25 years, mainly due to the link with falls and the risk of fractures, as well as the difficulty in withdrawing patients from the drug (Parr et al, 2009): “It has been widely documented that the use of benzodiazepines in individuals already predisposed to falls can further contribute to future falls.” Dr. Byrne adds that research literature has also identified neuroleptics, long-acting anticholinergic and long-term opioids, as quite problematic and contributing to falls and adverse drug events. In both NI and ROI there were high rates of prescribing for these medications.

Cost of medicines

Apart from the health risks for older people receiving potentially inappropriate medicines, they represented a considerable expenditure. The study examined in detail the net ingredient cost of the PIMs and estimated a figure of approximately €166,000 per year for the 630 older people studied, an average potential loss of €263 per head.⁴ These figures exclude other factors affecting the final price of medicines such as prescribing costs and VAT.

In NI the estimated net ingredient cost of the PIMs was calculated to be approximately €54,000 per year; the figure for the Cork sample was much higher at approximately €112,000. This is partly because of the higher rates of PIM in the Cork care facilities. In addition, nearly half the medications prescribed in NI were generic (48.5%), but this was true of only 28.4% of the drugs prescribed in ROI. Another important factor was the much higher cost of medicines in ROI compared with their equivalents in NI. The report gives these examples:

⁴ The report used the exchange rate applying when the calculations were made of £1 = €1.135

Table 3 :

Comparative cost of selected medicines in NI and ROI

Medicine	NI	ROI
Lanzoprazole, 28-day supply 30mg	€3.17	€22.05
Risperidone, 28-day supply 0.5mg	€2.15	€8.77
Zyprexa,® 28-day supply 2.5mg	€24.80	€47.16
Durogesic® opioid patch, 28-day supply	€109.78	€156.90

Byrne and his colleagues argue that the routine application of a screening tool like STOPP could offer a reasonably cheap and time-efficient method to optimise pharmacotherapy.

One interesting finding in both NI and ROI datasets was that very old age i.e. over 90 years was actually associated with a reduction in the number of medicines prescribed, which contradicts most of the evidence in the published literature but may require further investigation. This work has highlighted a number of areas of prescribing concern, such as the long-term use of both benzodiazepines and hypnotics in older residents in long-term care facilities. Further investigation is needed into the underlying reason for the prescribing concerns in these areas highlighted by this research, and the need for strategic approaches to the issues involved with IP should be developed at a national level.

Policy implications

Inappropriate prescribing has been a research topic for more than 30 years and the first guidelines to deal with it in the USA were developed in 1991. The NI study of inappropriate prescribing in nursing homes (Patterson *et al*, 2010) was preceded by qualitative research suggesting how a new model of patient care could be developed based on the USA approach. The research examined changes that might be needed to adapt the model for local use (Patterson *et al*, 2007). For example, unlike the USA, the UK [and ROI] has “no equivalent legislation to challenge the prescribing of psychoactive drugs and pharmacists are not required to monitor their use or indeed the use of any other drugs”. The report provided interesting insights, such as:

- All participants commented that many nursing home residents were exposed to excessive prescribing that was poorly managed.
- All prescribing support pharmacists who took part in focus groups for the research referred to the over-use of psychoactive drugs, suggesting that these drugs were prescribed for the convenience of nursing home staff, which was also reported by the GPs. Many participants raised concerns over the use of these drugs, particularly with regard to their potential to cause

adverse reactions with serious consequences for older people
e.g. over-sedation and falls.

- Medication review was not routinely undertaken, but was viewed by participants as a way of improving prescribing, reducing errors and potentially reducing workload, as well as reducing costs (Patterson *et al*, 2007).

Patterson and her colleagues advocated a new model of care, central to which is partnership working by doctors, pharmacists, nurses, nursing home staff and residents or relatives. The GP was seen as central to the process: "In the UK, GPs, usually from multiple practices, prescribe for residents and there is little formal pharmacist contact. In undertaking this new model of care, the prescribing support pharmacists felt it would be necessary to involve the GP at all stages." Later the report adds: "Nursing home managers identified the GP as the key player to the success of a pharmaceutical care service. They also favoured face-to-face discussions with the GP about residents' medication-related problems and that solutions should be agreed and documented in the patient care plans" (Patterson *et al*, 2007).

Some steps have been taken at government level. These include pharmacist prescribing under the Minor Ailments Service, nurse prescribing and a move towards generic prescribing.⁵ In 2002, the Northern Ireland Medicines Governance Team was created. It is responsible for tasks such as promoting the reporting of medicine incidents, the analysis of these reports, spreading good practice and developing risk management.⁶

One of the relevant policies in NI is "Enhancing Primary and Community Care" (DHSSPS, 2006a: 18), which states that:

Medicines management services directed at older people are designed to ensure that patients gain maximum benefits from their medicines and are not exposed to adverse incidents arising from excessive, inappropriate or sub-optimal doses of medicines.

In the same year the DHSSPS issued another relevant document setting out appropriate standards (DHSSPS 2006b), which include "safe practice in the selection, procurement, prescription, supply, dispensing, storage and administration of medicines across the spectrum of care and support provided, which complies with current medicines legislation".

In the Republic of Ireland, the Health Information and Quality Authority (HIQA) is the body responsible for standards of health and care through monitoring and inspection, setting standards and providing information. Its standards for residential homes for older people (HIQA, 2009) include several that are related to medicines and medication monitoring and review, including:

⁵ See <http://www.dhsspsni.gov.uk/index/pas/pas-map/pas-psip.htm>

⁶ There are local enhanced services offered to GP practices by the HSCB, often involving the employment of pharmacists to conduct medication reviews targeted at patients at highest risk of adverse drug effects, such as care home residents or older people with multiple co-morbidities.

- 14.2 Requirements for a medication management policy and procedures that meet legal and professional requirements or guidance.
- 14.3 Procedures for the safe administration of medication.
- 14.4 Reporting and analysis of all medication errors to improve patient safety and prevent recurrence.
- 15.4 Suspected adverse reactions documented and discussed with the medical officer or GP and reported to the Irish Medicines Board.
- 15.5 Each resident on long-term medication is reviewed by his/her medical practitioner every three months, along with nursing staff and the pharmacist.

Conclusion

Research suggests that one-fifth of older people living at home are taking five or more medicines. The research in Northern Ireland and the Republic of Ireland summarised in this briefing shows that the residents of long term care facilities were frequently prescribed 11 medicines and frequently take an average of 8 medicines daily. Approximately 70% of long-term care facility patients were taking one or more potentially inappropriate medicines. This has serious implications for the older people involved since adverse drug reactions can occur, including falls and fractures. Moreover these adverse drug events can lead to extended hospitalisation, at an additional cost to the health services. Inappropriate medicines cost a considerable amount of money, an important consideration in a context where overall spending on medicines is high and rising and the growing number of older people suggests that pressure on pharmacy products will continue to increase.

Research suggests that new models of care involving collaboration by GPs, pharmacists, nurses, care workers and older people can be effective. In addition tools such as the STOPP criteria can be used to detect potentially inappropriate prescribing at little cost.

The full report, *An evaluation of the inappropriate prescribing in long stay elderly facilities in the greater Cork and Northern Ireland regions using the STOPP and Beers criteria*, is available at www.cardi.ie.

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