Implementation of STOPP (Screening Tool of Older Person’s Prescriptions) and START (Screening Tool to Alert doctors to Right Treatment) as a clinical pharmacy service to facilitate three monthly medication reviews in an elderly community nursing unit population.

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The views and findings expressed within this thesis are those of a student author. They do not represent the views of the University and are not endorsed by the University and nor is any assurance given as to the accuracy of the finding within the thesis.
Abstract

Objective

The objective of this study was to implement STOPP (Screening Tool of Older Person’s Prescriptions) and START (Screening Tool to Alert doctors to Right Treatment) as a clinical pharmacy service to facilitate three monthly medication reviews in an elderly community nursing unit population. The study also evaluates the acceptability of the clinical pharmacy service to General Practitioners.

Setting & Methods

In 2009 the Health Information and Quality Authority (HIQA) set down National Quality Standards for Residential Care Settings for Older people in Ireland. These standards are written into Irish legislation and Residential Care Units (public, private, voluntary) must meet all of the required standards prior to registration. Standard 15 specifically states that each resident on long-term medication should be reviewed by his/her medical practitioner on a three monthly basis, in conjunction with nursing staff and the pharmacist. STOPP and START as a clinical pharmacy service was implemented in two Residential Units in the Dublin Mid-Leinster Region to facilitate three monthly medication reviews. A total of 103 residents ≥65 years from Birr and Edenderry Community Nursing Units were eligible for inclusion (exclusion criteria included terminally ill or respite patients) in the study and six General Practitioners participated in the study. Each General Practitioner completed a post service evaluation interview to determine the acceptability of STOPP and START as a clinical pharmacy service.
Key findings

Of the residents reviewed (n=103), 75 (72.8%) were female; the median age was 86 years (IQR: 66-103) for the entire dataset. The total number of regular medicines prescribed was 884 (Median 9). 75.7% (78) residents had at least one potentially inappropriate medicine (PIM) or prescribing omission identified by STOPP and START criteria. 65% of potentially inappropriate prescribing involved use of medicines that had unfavourable risk benefit ratio according to STOPP and 34.8% were instances of PIM through omission of potentially beneficial medicine according to START. 46.6% (95) of all recommendations were accepted and implemented by General Practitioners participating in the study. Of all recommendations declined a valid reason was provided in 93.5% (102) of cases. All General Practitioners interviewed found STOPP/START to be acceptable as a clinical pharmacy service, they agreed the service aids completion of three monthly medication reviews and feel it would be feasible to introduce the service in other community nursing units.

Conclusion

Implementation of STOPP and START as a clinical pharmacy service in an elderly Community Nursing unit population facilitates the three monthly medication reviews required to meet HIQA’s medication monitoring and review standard. STOPP and START as a clinical pharmacy service is acceptable to General Practitioners providing a medical service in Birr and Edenderry Community Nursing Unit.
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To my family and John, I would like to thank you for your love, understanding and motivation that kept me going throughout the year.
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1.0 Introduction

1.1 What is Inappropriate Prescribing (IP) in the elderly?

The primary aim of prescribing is to cure disease, eliminate or reduce symptoms relating to an underlying disease state and improve functional capacity of patients (Hanlon et al. 2001)

1.1.1 Appropriate Prescribing

Appropriate prescribing is a general concept which encompasses a range of different prescribing values and practices (Spinewine et al. 2007).

Several important factors must be taken into consideration when defining appropriate prescribing for an individual patient (Spinewine et al. 2007):

- What the patient wants,
- What the patient needs,
- Scientific rationalism (including the clinical pharmacology of certain drugs).

However, appropriate prescribing in older people is complicated by a number of factors which should also be taken into consideration (O’Mahony et al. 2008):

- Life expectancy of the patient,
- The right therapeutic approach in patients with poor prognosis and;
- Selection of the pharmacotherapy with the most favourable risk/benefit ratio.
1.1.2 Inappropriate Prescribing

The concept of Inappropriate Prescribing (IP) in older people includes several aspects of prescribing as follows:

- Over prescribing of medication i.e. polypharmacy, relates to the practice of prescribing multiple medications or more medications than are clinically required.
- Over prescribing also encompasses the use of medicines at higher frequency and for longer durations than are clinically indicated.
- IP includes the prescribing of medicines that introduce the risk of an adverse drug event (ADE) particularly where there is evidence in favour of a safer or more effective but lower-risk alternative therapy to treat the same condition.
- IP also encompasses the prescribing of medicines with inherently high risks of adverse drug-drug interactions and drug-disease interactions.
- The practice of prescribing certain medications which are not clinically beneficial or indicated for a specific patient.
- The prescribing of medications which may fulfil an intended therapeutic purpose but for which a more effective agent is available.
- Prescribing of a drug or drug class which is likely to exacerbate a clinical problem in older patients, e.g. the use of benzodiazepines in older patients with a past history of falls.
- Under use of beneficial medication that are clinically indicated but not prescribed for ageist or irrational reasons e.g. withholding a
bisphosphonate from a patient on maintenance corticosteroid therapy.

(Byrne et al. 2010, Gallagher et al. 2007)

### 1.1.3 Inappropriate medications

A number of medications exhibit an increased potential to cause problems in older patients and these medications have been classified as potentially inappropriate for use in older patients. Medications which are identified as high risk or potentially inappropriate in older patients do not cause problems in all older patients but do have increased potential to cause harm (Chukta et al. 2004).

A potentially inappropriate medicine (PIM) in older patients may be defined as a medication which (O’Mahony et al. 2008):

- Has no clear evidence-based indication,
- Has a substantially higher risk of causing an ADE and,
- Is not cost-effective.

### 1.2 Why is Inappropriate Prescribing (IP) a particular problem in the elderly population?

Inappropriate Prescribing (IP) exists in all sectors of the population but the elderly (defined as those aged 65 or older) are at particular risk because of several inter-related factors.
1.2.1 Age related pharmacokinetic and pharmacodynamic changes.

Age-related changes in the pharmacokinetics and pharmacodynamics of drugs alter the drug disposition and response to medications in elderly patients. Pharmacokinetic changes can result in increased serum drug concentrations and enhanced drug effects.

(Shelton et al. 2000; Avon&Shrank 2008)

These changes in drug handling mean drugs often have prolonged duration of action, greater risk of toxicity and drug interactions, increased frequency of Adverse drug events (ADEs) and greater or lesser effects than anticipated for a given dose (Chutka et al. 2004).

One specific example of how age-related altered pharmacokinetics can affect pharmacotherapy is an elderly patient with chronic heart failure (CHF) treated with digoxin and an angiotensin converting enzyme (ACE) inhibitor.

Digoxin is well absorbed in the gastrointestinal tract. However, the time to reach steady state increases from 7 to 12 days in elderly patients. The volume of distribution is reduced in the elderly due to impaired renal function and reduced lean body mass (Table 1). Therefore, the loading and maintenance dose of digoxin should be reduced in the elderly.

Many ACE inhibitors are pro-drugs undergoing activation in the liver (i.e. perindopril, enalapril). In the elderly, their ability to activate ACE inhibitors may be impaired particularly if they have severe heart failure or hepatic congestion. ACE inhibitors are excreted renally, therefore low initial doses
and careful titration are recommended (Mangoni&Jackson 2003; Hilmer et al. 2006).

An example of pharmacodynamic age-related change is the effect of verapamil on the elderly patient. Elderly patients are less sensitive to the effects on cardiac conduction but more sensitive to the effects on heart rate and blood pressure. This is thought to be caused by increased sensitivity to the negative inotropic and vasodilatory effects of verapamil in combination with reduced baroreceptor sensitivity.

Other examples include reduced sensitivity to insulin and heightened sensitivity to benzodiazepines and opiates (Mangoni&Jackson 2003; Hilmer et al. 2006).

1.2.2 Physiological changes related to ageing and chronic diseases.

Age related physiological changes (Table 1 below) affect cardiac structure and function, the renal system, the gastrointestinal system, neuroendocrine responses and body composition. As a result the elderly have limited physiological reserve, reduced homeostasis, and dysregulation in immune and inflammatory mechanisms (Mangoni&Jackson 2003).
Table 1: Physiological changes related to ageing and their impact on drug usage (Adapted from Prescribing in the Elderly. National Medicines Information Centre 2010 Vol 16: No.3)

<table>
<thead>
<tr>
<th>Change</th>
<th>Significance for Drug use.</th>
<th>Examples of drugs affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑Body fat mass</td>
<td>↑ time to onset of action of, and prolonged t½ for, fat soluble drugs</td>
<td>Diazepam, verapamil</td>
</tr>
<tr>
<td>↓Lean body mass ↓total body water</td>
<td>Higher than expected plasma levels of water soluble drugs</td>
<td>aspirin, lithium, alcohol</td>
</tr>
<tr>
<td>↓Renal Function</td>
<td>↓ creatinine clearance and potential accumulation of renally excreted drugs.</td>
<td>lithium, digoxin</td>
</tr>
<tr>
<td>↓Liver blood flow +/- ↓liver function</td>
<td>May lead to ↓ metabolism of drugs via phase 1 + 2 metabolic systems/↑ bioavailability of first pass effect drugs</td>
<td>warfarin, amiodarone, fentanyl, nifedipine, nitrates, tricyclic antidepressants.</td>
</tr>
</tbody>
</table>

In 2004, Naughton and colleagues estimated the prevalence of chronic disease in Ireland’s elderly using the Irish HSE-Primary healthcare reimbursement services (HSE-PCRS) pharmacy database. The study population was defined as all individuals aged ≥ 70 years who were dispensed three or more items associated with a specific chronic condition. They found 86% (271,518) of elderly patients received three or more drug items for at least one of nine chronic conditions (classified as cardiovascular disease (CVD), central nervous system (CNS) disease, musculoskeletal conditions, diabetes, respiratory conditions, thyroid disorder, upper gastrointestinal conditions, glaucoma and cancer) and that
there was a high level of co-morbidity (Figure 1 below) (27% had two chronic diseases, 19% had three and 14% had four or more).

**Figure 1: The incidence of co-morbid disease in elderly Irish patients (Naughton et al. 2006).**

1.2.3 Polypharmacy

Polypharmacy may be defined as the administration of more medications than are clinically indicated (Hanlon *et al.* 2001). It is a term commonly associated with physicians prescribing tendencies for the elderly population, and greatly increases the risk of adverse drug events (ADEs) (Figure 2), geriatric syndromes (falls, hip fracture, urinary incontinence, cognitive decline) and healthcare costs (Hanlon *et al.* 2001, Chuka *et al.* 2004).

Polypharmacy is often the result of a ‘prescribing cascade’ (Figure 3) (Chutka *et al.* 2004) which begins when an elderly person experiences an
adverse drug reaction. It may be misinterpreted by the patient or doctor as a new medical condition or the ageing process itself (Avorn & Shrank, 2008). Another drug is then prescribed, and the patient is placed at risk of developing additional adverse effects relating to this potentially unnecessary treatment.

Figure 2: The relationship between adverse drug effects and polypharmacy (Adapted from Denham, 1990)

To prevent the prescribing cascade, doctors should always consider any new signs and symptoms as a possible consequence of current drug treatment (Avorn & Shrank 2008; Chutka et al. 2004; Rochon et al. 1997). Polypharmacy is particularly prevalent amongst older nursing home residents who receive up to four times as many prescription items as older people living in their homes (Furniss et al. 2000). In the European project AgeD in Home Care (ADHOC), polypharmacy (defined as nine and more
medications) was reported by 22% of older adults (≥65 years) in home care in Europe. In four of eight European countries the prevalence exceeded 20% (Finland 41%, the Czech Republic 39%, Iceland 32% and the UK 20%) (Fialovà et al. 2005).

It should however be borne in mind that the high prevalence of chronic disease, multiple co-morbidities and the expanding evidence base for pharmacotherapy in the elderly often justifies the use of several drugs concomitantly in this patient group.

**Figure 3: An illustration of the 'prescribing cascade'** (Adapted from Rochon & Gurwitz, 1997)
1.2.4 Availability of evidence for drug use in the elderly

Doctors base their prescribing decisions upon individual clinical experience, patient factors, cost and evidence based medicine (Sackett et al. 1996). However prescribing decisions are often complicated by lack of adequate evidence for drug use in older patients. Clinical trials are usually conducted in younger individuals and outcomes cannot be easily extrapolated to the elderly because of other factors including those discussed earlier (co-morbidities, polypharmacy, age related physiological changes and changes in pharmacodynamics and pharmacokinetics). As a result, seniors often take medications in the absence of evidence about their efficacy and safety in higher age groups or are denied potentially effective treatments because medication is untried in their age group (Godlovitch, 2003).

The organisers of the European project Increasing PaRticipation of the Elderly In Clinical Trials (PREDICT) summarised 5280 articles published before February 2008 (Beswick et al. 2008). They confirmed that the mean age of participants in clinical trials was much lower than that of real life users of medication.

The main reason for excluding older subjects from clinical trial included: medical factors (the high risk of adverse effects); scientific factors (omitting older subjects because they are more likely to be lost to follow up). No reasonable justification for excluding older adults was documented in 35-78% of studies. There is a gap to be filled in order to obtain better evidence for future treatment of older patients.
In summary age related pharmacokinetic and pharmacodynamic changes in drug handling, the physiological changes related to ageing, chronic diseases as well as polypharmacy and insufficient trial evidence all contribute to an increased prevalence of IP in the elderly compared to the general population.

When this is examined in terms of the Irish elderly population, currently 22.7% of people over 85 years are resident in long term care facilities (Barry *et al.* 2006, Central Statistics Office, 2007). Given that these residents are likely to receive up to four times as many prescription items as their counterparts living in the community (Furniss *et al.*, 2000), they face a much greater risk of polypharmacy and subsequently inappropriate prescribing. Given the anticipated growth in the Irish older population expected over the coming decades, there will probably be corresponding increases in the number of older individuals requiring long term care. Inappropriate prescribing needs to be address promptly in this population.

1.3 How can Inappropriate Prescribing (IP) be identified and corrected?

1.3.1 Explicit and Implicit measures

Criterion-based (explicit) and judgement-based (implicit) measures may be used to assess the appropriateness of prescribing. These measures maybe either process measures or outcomes measures; process measures assess whether the prescription complies with accepted standards and outcomes measures are indicators of adverse outcomes (e.g. adverse drug events (ADE), hospitalisation, reduced quality of life) that are secondary to inappropriate prescribing (Spinewine *et al.* 2007).
Explicit criteria are generally applied as rigid, ‘black and white’ standards, leaving little or no room for allowance of individual differences among patients. Pure implicit evaluations are based on clinical judgement and generally lack consensus –based structure (Shelton et al. 2000). Take for example the use of long-acting benzodiazepines in the elderly.

**Process-based implicit measure:**
An elderly lady is admitted to the nursing home for long term care. She has been taking long acting benzodiazepine each night for the last thirty years. The pharmacist and physician review her medication and agree that this medicine is increasing the patients fall and fracture risk. The pharmacist explains the risk to the elderly patients who feels she is not ready to stop nitrazepam given her new surroundings but agrees to attempt a progressive discontinuation once she has settled in.

**Process-based explicit measure:**
Using the same lady as an example; Prescription of long-acting benzodiazepines is inappropriate according to Beers’ Criteria (Fick et al. 2003) because these drugs have an extended duration of action in the elderly leading to extended sedation and an increased risk of falls and fractures. If a benzodiazepine is required then a short to intermediate acting drug should be used. Nitrazepam is stopped and replaced with lorazepam if required. This method doesn’t take individual patient preference and circumstance into consideration.
Outcome-based implicit measure:

A patient is admitted to hospital after a fall at home. The admitting doctor took the medication history from the GP referral letter and charted her regular temazepam 20mg at night. The pharmacist carried out a medication history and revealed that the patient had been taking temazepam regularly for insomnia since her husband died two weeks ago. The pharmacist evaluated this information and concluded that the admission was drug-related and preventable. Consideration should be given to reducing the dose of temazepam and further need for its use should be reviewed regularly.

Outcome-based explicit measure:

The same patient is admitted after a fall taking temazepam 20mg at night. According to Beers’ Criteria (Fick et al. 2003) temazepam should not be prescribed to elderly patients above 15mg and if there is a history of falls it should not be prescribed at all. Temazepam was discontinued by the physician. The patient’s individual circumstances (emotional upset after the lost of her husband) were not taken into consideration.

The combination of both explicit and implicit criteria is patient specific and complementary, providing a method that is structured, yet one in which the reviewer can apply clinical judgement when necessary (Spinewine et al. 2007).
Table 2: Advantage and disadvantages of implicit and explicit measures (Fialová et al. 2009)

<table>
<thead>
<tr>
<th>Explicit</th>
<th>Implicit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advantages</strong></td>
<td><strong>Disadvantages</strong></td>
</tr>
<tr>
<td>Consistency of approach to individual care.</td>
<td>Usually either drug or disease orientated and do not allow flexibility in individual patients.</td>
</tr>
<tr>
<td>Can be adapted to computerised systems.</td>
<td>Can produce false positive results.</td>
</tr>
<tr>
<td>Can incorporate information from published literature and expert consensus.</td>
<td>Need problems to be pre-specified.</td>
</tr>
<tr>
<td>Can be easily used for educational purposes, drug utilization reviews and epidemiological studies.</td>
<td>Miss some problems that may be identified only during a full assessment of the patient.</td>
</tr>
</tbody>
</table>

1.3.2 Validated Screening Tools for Potentially Inappropriate Prescribing (PIP)

A literature search identified many methods for identifying and correcting potentially inappropriate prescribing (PIP). However, only two well described and validated screening tools were identified (Beer’s Criteria and IPET) as well as a third recently published tool Screening Tool for Older Person’s Prescriptions (STOPP) and Screening Tool to Alert doctors to Right Treatment (START) (McLeod et al. 1997, Fick et al. 2003, Gallagher et al. 2008).
1.3.2.1 **Beers’ Criteria**

Beers’ Criteria, a United State (US) based guideline, was originally formulated in 1991 (Beers et al. 1991). This screening tool contains 30 medicines that should not be used in older patients. It was compiled for nursing home residents who are considered frailer, older and sicker than the general elderly population. The authors therefore cautioned that modifications may be necessary if the criteria were to be applied to older patients in non-nursing home setting. The original criteria were updated and expanded in 1997 and again in 2003 the inclusion of new drugs, incorporation of new evidence based practice, identification of new conditions and considerations all served to make the criteria more applicable to the general older population (Fick *et al.* 2003).

The most recent version of Beers’ Criteria (2003) consists of two lists. The first is a list of 48 drugs or classes of medication that should be avoided in elderly people. This list is independent of diagnosis (ID). The second list specifies 20 diseases or conditions and medications to be avoided in elderly patients with those conditions (considering diagnosis, CD). The lists outline the potential negative outcomes associated with prescriptions of the potentially inappropriate medicine (PIM) and also rates their severity.

Despite the fact that Beers’ Criteria are by far the most commonly referred to screening tool in the literature (Onder *et al.* 2003, Fialovà *et al.* 2005, O’Mahony&Gallagher 2008, Gallagher *et al.* 2008b) there are a number of
problems with Beers' which prohibit its application routinely in the Irish clinical practice setting.

Firstly, Beers’ Criteria contain many drugs that are not available or seldom used in the Irish setting. These drugs include cyclandelate, chlorpropamide and thioridazine.

Beers’ Criteria prohibits the use of several drugs which are not strictly contraindicated in elderly patients. These drugs are often used very successfully in the treatment of Irish elderly patients e.g. amiodarone, doxazosin and amitryptiline.

The criteria are not designed in a logical order thus rendering them too time consuming and inconvenient for routine clinical practice.

Beers’ Criteria make no reference to PIP by omission of potentially beneficial drugs e.g. prescribing a bisphosphonate in patients taking maintenance steroids.

1.3.2.2 Improved Prescribing in the Elderly Tool (IPET)

McLeod and associates used a modified Delphi approach to develop a national consensus-based list of inappropriate practices in prescribing for elderly people and a recommendation for alternative therapy (McLeod et al. 1997). The list contained 38 criteria identifying inappropriate prescribing practices which were further categorised into: cardiovascular diseases, psychotropic, analgesic agents and miscellaneous drugs (McLeod et al. 1997).

In 2000 Naugler et al. applied this list to a series of hospital inpatient charts. By identifying the 14 most commonly encountered inappropriate prescribing practices in a Canadian clinical practice setting Naugler and
colleagues were able to develop and validate the Improved Prescribing in the Elderly Tool (IPET).

There are a number of limitations to the use of IPET in an Irish setting (Ryan et al. 2008). While IPET is concise, it has not been organised in a logical manner making it difficult to apply effectively. It only contains 14 examples of potentially inappropriate prescribing leading to the omission of important inappropriate prescribing instances such as selective serotonin re-uptake inhibitors with a history of hyponatraemia; proton pump inhibitors for peptic ulcer disease at full therapeutic dosage for > 8 weeks and prescribing of duplicate classes to name but a few (Ryan et al. 2008). It does not address the issues of under use of medicines i.e. omission or failure to prescribe an appropriate medicine for patients with existing diagnoses i.e. the use of calcium and vitamin D₃ supplements in patients with osteoporosis (Dhesi et al. 2006).

1.3.2.3 Screening Tool of Older People’s potentially inappropriate Prescriptions (STOPP) and Screening Tool to Alert doctors to Right Treatments (START) (Appendix 1)

The Pharmaceutical Care Research Group, School of Pharmacy and University College Cork devised STOPP (Screening Tool of Older Persons’ Potentially inappropriate Prescriptions) and START (Screening Tool to Alert doctors to the Right Treatment) criteria in response to their belief that PIP (potentially inappropriate prescribing) is an important but inadequately addressed issue in Ireland. They recognised that Beers’ Criteria and the IPET tool are far from ideal when applied in an Irish setting and aimed to develop a new tool which would aid identification and
correction of PIP when applied by general practitioners (GPs) and pharmacists (Ryan et al. 2009).

The STOPP tool lists 65 instances of PIP and is divided into ten sections according to the physiological systems to which PIP relate. The START tool lists 22 common instances of PPOs divided into six physiological systems to which the PPOs (potential prescribing omissions) pertain. The initial list of criteria was formulated based on a combination of evidence and common instances of PIP and PPOs observed throughout clinical working practice.

The STOPP and START tools were validated by the Delphi validation method. An expert panel of geriatricians, clinical pharmacologists, old age psychiatrists, primary care physicians and hospital pharmacists with a special interest in geriatrics from across the United Kingdom (UK) and Ireland were recruited to validate the criteria using Delphi consensus technique. The result was a set of 87 criteria encompassing both instances of PIP and instances of omission of potentially beneficial medication (Gallagher et al. 2008).

STOPP/START is current and relevant to Irish practice as it focuses on medicines routinely prescribed to older patients in Ireland. It links the prescription of these medicines to potential problems associated with their use in the context of patients’ co-morbidity and medical history. As well as referring to drug-disease interactions it also considers drug-drug
interactions, therapeutic duplication and drugs that increase the risk of falls.

The reliability and generalisability of STOPP/START was investigated in two studies.

The first examined the inter-rater reliability of STOPP/START amongst 8 hospital physicians in 6 European countries who were provided with 20 datasets outlining patient cases (Gallagher et al. 2009). Inter-rater reliability was found to be good. Disagreements in a minority of instances reflected the fact that details on functional status and life expectancy were not provided with the cases which are important considerations when applying STOPP/START criteria. It was found that STOPP/START was applicable across all six countries despite differences in national prescribing guidelines and formularies.

Ryan et al. (2009a) determined the inter-rater reliability of STOPP/START amongst a group of clinical pharmacist working in either primary or secondary care. Each pharmacist applied the STOPP and START criteria to a number of datasets similar to those provided to physicians in the aforementioned study (Gallagher et al. 2009). The results showed that inter-rater reliability amongst pharmacists working in different sectors was good. Pharmacists can use STOPP and START to identify PIM and PPOs in older patients with a similar degree of reliability as hospital physicians working in geriatric medicine.
1.3.3 Other methods of identifying Inappropriate Prescribing (IP)

1.3.3.1 Computerised alerts

A study examining the effect of access to a computerised clinical decision making system to identify IP in primary care found that such a system reduced the rate of initiation of IP but does not influence discontinuation of potentially inappropriate medication except in cases of therapeutic duplication (Tamblyn et al. 2003).

1.3.3.2 Drug Utilisation Evaluation (DUE)

DUE utilises explicit criteria to measure both the processes and outcomes of prescribing. It assesses indication, critical process indicators, complications and outcomes (Knapp 1991). According to Shelton and colleagues DUE is a time consuming process, it is drug specific and therefore does not allow for a comprehensive assessment of medication regimens in individual patients. They found the reliability of DUE to be questionable, particularly in the assessment of therapeutic outcomes (Shelton et al. 2000).

1.3.3.3 Minimum Data Set 2.0 (MDS)

The Minimum Data Set (MDS) forms part of the Resident Assessment Instrument (RAI) used to perform comprehensive functional assessments of nursing home residents in the US (Morris et al. 1991). MDS reviews areas such as activities of daily living, nutrition, continence, behaviour and cognition. Certain responses within the MDS trigger the need for a more thorough evaluation using Resident Assessment protocols (RAPs). RAPs
provide a systematic approach to problem solving and care planning when potential drug-related problems are identified by the MDS. MDS does not evaluate a medication regimen directly, but highlights medications as a potential cause of functional changes such as increased falls, continence and cognition (Shelton et al. 2000).

### 1.3.3.4 Medication Appropriateness Index (MAI)

The MAI measures prescribing appropriateness in terms of indication, effectiveness, dose, correct directions, drug-drug interactions, drug-disease interactions, therapeutic duplication, duration and cost. The MAI is classified as an implicit measure as clinical judgement is required to assess some of the criteria, but it does have explicit instructions which standardise the rating process (Hanlon et al. 1992).

MAI has been reviewed in two articles dealing with the assessment of inappropriate prescribing in the elderly (Shelton et al. 2000 & Spinewine et al. 2007). Both articles consider MAI to be a reliable and valid instrument for assessing medication appropriateness. However, it was found to be time-consuming (an estimated 10 minutes per medication) and does not assess under prescribing.

### 1.3.3.5 Lipton’s Criteria

Shelton and colleagues reviewed Lipton’s Criteria. They found the main advantage of Lipton’s criteria is that its design incorporates explicit categories and definitions to which the reviewer may apply implicit judgement. In addition the criteria are not drug specific allowing the
reviewer to assess each medication individually. Disadvantages of the criteria include lack of a weighted scoring system and lack of evidence for the criteria’s reliability and validity (Shelton et al. 2000).

### 1.3.3.6 Assessing Care Of the Vulnerable Elderly (ACOVE)

This is a set of quality of care indicators relevant to elderly people, 29% of which refer to medication (Wegner & Shekelle 2001). Systematic reviews of publications, expert opinion, and the guidance of expert groups were used to develop indicators which pertain to treatment, prevention, monitoring, education and documentation, they encompass over prescribing, misprescribing and under prescribing. The indicators are applicable to people with advance dementia and poor prognosis (Spinewine et al. 2007).

### 1.3.3.7 Clinical medication review by a pharmacist in care homes.

The value of a pharmacist in conducting regular medication reviews to reduce IP in hospitals is well established however there is still some debate surrounding the benefit of clinical pharmacist review in the nursing home setting.

In a recent systematic review of interventions to optimise prescribing in care homes Loganathan et al. (2011) identified three studies investigating the impact of pharmacist medication reviews on prescribing.

The first demonstrated that clinical pharmacists can review care home patients’ medication and make recommendations to the GP that are usually accepted. This leads to a substantial change in patients’
medication regimens (medications discontinued and commenced) without a significant change in drug costs. These interventions seem to reduce the number of falls in this very frail group of patients. However, there was no significant change in consultation, hospitalisation or mortality rates (Zermansky et al. 2006).

The second study examined the effects of medication review by a pharmacist and found there was a reduction in the number of drugs prescribed with a corresponding saving in drug costs but no statistically significant difference was recorded (Furniss et al. 2000).

The failure to demonstrate any significant effect of pharmacists' interventions on prescribing maybe partly due to the inappropriate choice of outcome measures. All three studies used change in number of medications as a primary outcome measure (Zermansky et al. 2006, Robert et al. 2001, Furniss et al., 2000). Although with increased number of medication there is greater likelihood of adverse drug reactions, polypharmacy does not always reflect appropriateness of prescribing, as the initiation of some medications may be clinically indicated.

1.3.3.8 Clinical medication review by a multidisciplinary team (MDT).

In a systematic review of interventions to optimise prescribing in care homes Loganathan et al. (2011) identified three studies evaluating the effect of MDT meetings. Two of the studies showed statistically significant changes in medication related outcomes (Schmidt et al. 1998, Crotty et al. 2004). In the third study conducted by King et al. 2001 it was found that selection bias may have affected the results.
In 2004, Schmader and colleagues determined whether inpatient or outpatient geriatric review by a multidisciplinary team involving geriatricians, social workers, nurses and pharmacists would impact on the rate of ADEs and IP in frail elderly patients when compared to usual care. They found that outpatient MDT review reduces serious adverse drug reactions and IP and inpatient MDT review reduces IP (Schmader et al. 2004).

In a similar study Allard et al. (2001) evaluated the impact of clinical medication review by a multidisciplinary team (MDT) consisting of two physicians, one nurse and one pharmacist on the prescribing practices of GPs. The MDT reviewed the diagnoses and medication in 136 community dwelling elderly people and made evidence based recommendations which were posted to the patients’ GP with the aim of reducing IP. The main outcome measure was a reduction in the number of PIPs. The study found that there was a non-significant reduction in the amount of IP prescribed.

Finally, in a recent study Pope et al. (2011) found no benefit to specialist geriatric input and medication review in patients in high-dependency continuing care. The authors noted that specialist geriatric medication review did not improve mortality or frequency of admission to acute hospital care but it did reduce the number of medications used and net costs in continuing care patients (Pope et al. 2011)
1.4 What is the impact of Inappropriate Prescribing (IP)?

The relationship between exposure to potentially inappropriate medication and adverse drug events (ADEs), health service utilisation and mortality has been examined in the literature with conflicting results.

A number of studies have found that the rate of ADR-related hospital admission in the elderly ranges from 13 to 21% (Beijer & de Blaey 2002, Primohamed et al. 2004, Mannesse et al. 2000). Elderly ADR-related hospital admission rates are up to four times higher than for non-elderly people (Beijer & de Blaey 2002, Primohamed et al. 2004), and up to 88% were considered preventable (Beijer & de Blaey 2002).

A medline search identified two studies related specifically to the impact of IP on elderly nursing home residents (Perri et al. 2005, Lau et al. 2005). The first study examined the association between IP and adverse health outcomes (defined as hospitalisation, emergency department visits, or death). Over 1000 nursing home residents in 15 long-term care facilities in the USA were included in the study. The investigators used Beers’ Criteria in their retrospective review of patients’ charts to identify inappropriate medication use, they also considered whether the drugs used were appropriate for each patient’s diagnoses, therapeutic duplication, acute medications being used for chronic use, or potential adverse drug-drug, drug-disease interactions. They found that patients subject to IP were 2.3 times more likely to have an adverse health outcome than those without IP (Perri et al. 2005).
The second study investigated the association between potentially inappropriate medication (PIM), hospitalisation and death among elderly nursing home residents. The investigators found that potentially inappropriate medication increased the risk of both hospitalisation and death in a sample of 3372 elderly nursing home residents in the USA (Odds Ratio (OR) = 1.27 and 1.28 respectively) (Lau et al. 2005).

Two studies were identified which question the association between IP, ADEs and health service utilization (Laroche et al. 2006 & Onder et al. 2005).

Laroche and colleagues investigated the relationship between the occurrence of ADR and IP. A total of 2018 patients >70 years were admitted to a geriatric unit over a 4 year observation period. IP was identified using the 1997 Beers' Criteria and ADEs were identified by clinical pharmacologists. Using multivariant analysis the investigators concluded that IP was not associated with a significant increased risk of ADEs and that a reduction in the number of drugs prescribed was the main preventable factor (Laroche et al. 2006).

The second study, based in Italy, investigated the impact of inappropriate drug use as identified by Beers' Criteria (2003) on all-cause mortality, ADEs and length of stay amongst hospital inpatients. The study showed no significant effect of inappropriate drug use on any of the health outcomes apart from a weak association between the number of inappropriate medications and the length of hospital stay (Onder et al. 2005).
1.5 Impact of legislation on reducing inappropriate prescribing in nursing homes

1.5.1 Omnibus Budget Reconciliation Act of 1987

Excessive use of psychotropic medication was commonplace in nursing homes in the United States before the Omnibus Budget Reconciliation Act (OBRA-87) was passed in 1987. The Act created a set of national minimum standards of care and rights for people living in long term care facilities. Monthly medication reviews performed by clinical pharmacist became mandatory. The value of these pharmacist interventions was soon recognised. Gradually, pharmacist became involved not only in medication reviews but also in education activities for both physicians and nurses.

A number of studies evaluated the impact of OBRA 87 legislation on psychotropic drug use in US nursing homes all illustrated 30-45% decline in antipsychotic drug use (Rover et al. 1992, Garrard et al. 1995). In 2000 Hughes and colleagues compared prescribing of anti-anxiety/hypnotic drugs in five US nursing homes to nursing homes in Denmark, Iceland, Italy, Japan and Sweden where there was no legislation. The table below highlights that residents in Iceland were almost nine times more likely to receive anti-anxiety/hypnotic drugs in comparison to residents in the US.
Table 3: Comparison of likelihood of residents receiving anti-anxiety/hypnotic drugs in the USA and places where OBRA legislation has no standing (Hughes et al. 2000)

<table>
<thead>
<tr>
<th>Country</th>
<th>% of residents using anti-anxiety/hypnotic drugs</th>
<th>Adjusted Odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>34.1</td>
<td>3.24 (2.99-3.51)</td>
</tr>
<tr>
<td>Iceland</td>
<td>61.8</td>
<td>8.80 (7.80-9.93)</td>
</tr>
<tr>
<td>Italy</td>
<td>34.2</td>
<td>2.18 (1.89-2.52)</td>
</tr>
<tr>
<td>Japan</td>
<td>24.8</td>
<td>2.11 (1.83-2.42)</td>
</tr>
<tr>
<td>Sweden</td>
<td>35.5</td>
<td>2.92 (2.49-3.42)</td>
</tr>
<tr>
<td>USA</td>
<td>14.2</td>
<td>1.0 (referent)</td>
</tr>
</tbody>
</table>

1.5.2 Health Information and Quality Authority (HIQA) –National Quality Standards for Residential Care Settings for Older People in Ireland

The Health Information and Quality Authority was established in 2007. It is an independent authority reporting to the minister for health. It was set up to drive quality, safety, accountability and the best use of resources in Ireland’s health and social care services.

In 2009 the Health Information and Quality Authority set down National Quality Standards for Residential Care Settings for Older people in Ireland. These standards are written into Irish legislation and Residential Care Units (public, private, voluntary) must meet all of the required standards prior to registration.

The Medication Monitoring and Review Standard states;

‘Each resident benefits from his/her medication to increase the quality or duration of his/her life. He/she does not suffer unnecessarily from illness
caused by the excessive, inappropriate or inadequate consumption of medicines’

The standard specifically states that each resident on long-term medication should be reviewed by his/her medical practitioner on a three monthly basis, in conjunction with nursing staff and the pharmacist. Special consideration should be given to the use of; antipsychotic medication, sleeping tablets, non-steroidal anti-inflammatory drugs.

1.6 Physicians’ attitudes towards and acceptance of Pharmacists’ Clinical Services

There is a gap in the literature about General Practitioners’ attitudes towards and acceptance of pharmacists’ clinical services in long term care facilities. A number of studies (Smith et al. 2002) found that physicians are generally receptive to a wide range of clinical pharmacy services if provided in a consultative or supportive role. However, most physicians were found to oppose autonomous decision making responsibility. Although physicians are receptive to the consultative services provided by pharmacists, the receptivity by individual physicians to those services is related to the value the physician attaches to the service and the physician’s perception of the pharmacist’s competence (Sulick and Pathak, 1996).
1.7 Aims and Objectives

Aims

To implement STOPP and START as a clinical pharmacy service to facilitate three monthly medication reviews in an elderly community nursing unit population.

To evaluate the level of acceptability of STOPP and START as a clinical pharmacy service to General Practitioners.

Objectives

To review and critically appraise the currently available literature relating to medication related interventions in the elderly population.

To develop a data collection tool that will facilitate the documentation of individual STOPP and START recommendations, level of acceptance of recommendations and reasons for acceptance or rejection of recommendations.

To write a standard operating procedure (SOP) outlining the implementation process for STOPP and START as a clinical pharmacy service in an elderly community nursing unit population.

To design and conduct semi-structured interviews with each general practitioner following implementation of STOPP and START to evaluate
acceptability of STOPP and START as a clinical pharmacy service in an elderly community nursing unit population.

To formulate recommendations relating to implementation of STOPP and START as a clinical pharmacy service to facilitate three monthly medication reviews in other elderly community nursing unit populations in the region.
2.0 Methodology

2.1 Literature Search

2.1.1 Search Strategy

A comprehensive search of the literature was undertaken with the objective of reviewing the currently available literature relating to medication interventions in the elderly population.

Electronic databases available from Robert Gordon University and the MRHT (Midland Regional Hospital Tullamore) online databases were searched using key search terms and phrases related to medication review, pharmacists, interventions, screening tool, elderly, aged, inappropriate prescribing. The initial strategy involved searching a wide range of electronic databases. EBSCO Host was used to individually search Biomedical Reference collection: Comprehensive, CINAHL Plus with full text, Medline with Full Text, Nursing and Allied Health Collection: Comprehensive. BMJ online, BMJ Clinical Evidence and BMJ Journal collection were also searched. Searches were also conducted in PubMed, WILEY InterScience, Science Direct, MD Consult: Journals/Medline, International Pharmaceutical Abstracts and the search engine WEBFEAT. SwetWise was used to identify all journals with ‘ageing’, ‘geriatric’ or ‘gerontology’ in their title and these were individually searched.

To ensure the search strategy included areas of ‘grey literature’, the European Union of Geriatric Medicine Society conference abstracts (2005-2010) and the websites of the Irish Gerontological Society and International Association of Gerontology and Geriatrics was searched.

Attendance at the European Union of Geriatric Medicines Society
conference in September 2010 provided valuable insight on latest research using STOPP and START in the Irish and European setting. The literature search was limited to studies undertaken in humans that were published in English. There were no year restrictions included in the search strategy. Publications considered most relevant were also subjected to a ‘related articles’ search in PubMed. References in any relevant papers found were used to direct the researcher to other useful studies.

2.2 Ethical Approval

Ethical approval was granted for this study by the Research Ethic Committee of Robert Gordon University on 8th March 2011. Local ethical approval was sought from the Research Ethics Committee, HSE-Midland Area. After review, the Research Ethics Committee was of the opinion that the quantitative element of the research was implementation of good clinical practice and as such did not require ethics review. The qualitative element of the research involved interviews with the General Practitioners, this was reviewed by the Research Ethics Committee. There were no ethical issues raised and Ethical approval was granted.

2.3 Population under study

This study was a prospective study of elderly residents in Birr and Edenderry Community Nursing Units, HSE-Dublin Mid-Leinster Region and General Practitioners providing a medical service to residents of Birr
and Edenderry Community Nursing Units, HSE-Dublin Mid-Leinster Region.

2.4 Sampling Strategy

2.4.1 Inclusion criteria

- All Patients (long-term and rehabilitation) ≥65 years resident in Birr and Edenderry Community Nursing Units.
- All General Practitioners providing a medical service to Birr and Edenderry Community Nursing Units.

2.4.2 Exclusion criteria

- Respite or terminally ill (life expectancy under 1 month)

2.4.3 Sample Size and Implementation Period

The patient population in Birr Community Nursing Unit is approximately ninety while the patient population in Edenderry Community Nursing Unit is approximately forty. The sample size was limited by the number of residents eligible for inclusion in the study. It was expected that there would be approximately one hundred patients eligible for inclusion.

The clinical pharmacy service was implemented in Birr Community Nursing Unit during April and May 2011 and Edenderry during June 2011.

2.5 Data Collection

2.5.1 Development of the Data Collection Tool

It was necessary to design a data collection tool that would ensure the data collector gathered all required information in a systematic manner.
The resulting tool was separated into seven different sections which clearly guided the collector into gathering relevant patient details to create a comprehensive patient profile and apply the STOPP and START prescription screening criteria.

2.5.2 Details of Information Required by the Data Collection Tool

The data collection tool was divided into seven separate sections (Appendix 2):

Section 1 was for collecting information on the patient’s sex, age, General Practitioner and location. The information collected in section 2 was details pertaining to the patient’s past medical history. Section 3 was used for the recording of relevant laboratory data and clinical observations such as blood pressure, blood glucose measurements or changes in body weight. Details of the patient’s regular medication and when required medication was recorded in section 4. Section 5 was used to record the results of applying STOPP/START to the patient’s medication while section 6 was used to record any other pharmacy recommendations which did not have a STOPP/START code. Section 7 recorded details of the pharmacist’s consultation with the General Practitioner. Each recommendation detailed in section 5 and 6 was discussed with the General Practitioner. Section 7 documented whether the General Practitioner accepted and implemented the recommendations and the reason why certain recommendations were not accepted. Section 7 also ensured that medications reviewed were documented in the patient’s medical notes and a STOPP/START sticker was attached and signed by the Pharmacist and General Practitioner upon completion of the medication review.
Prescription charts, medical notes, nursing care plans and observation charts were consulted for each patient and used to complete section 1, 2, 3 and 4. Each patient data collection record was allocated a unique identification number (001,002…) at the point of recruitment for data protection and analysis purposes.

2.5.3 Development of the Service Evaluation Interview

It was also necessary to design a service evaluation interview schedule that would ensure the data collector gathered all the required information relating to the General Practitioners attitudes towards and acceptance of the clinical pharmacy service.

2.5.3.1 Details of Information required for Service Evaluation Interview

The service evaluation interview (Appendix 5) schedule included key questions pertaining to the acceptability of the clinical pharmacy service, whether or not the service aids completion of three monthly medication reviews. GP’s were asked about the feasibility of introducing the pharmacy service in other community nursing units, and any perceived barriers to the introduction of the pharmacy service in other community nursing units. The interview schedule was semi-structured to enable GPs to elaborate on any particular aspect of the service they wanted to discuss.

2.5.4 Data Collection Tool and Service Evaluation Interview: Piloting, Validity and Reliability

The organisation and structure of a data collection tool are important factors in ensuring reliable data collection and ease of use by the data abstractor (Gregory and Radovinsky, 2010). The data collection tool was organised in a logical manner, which corresponded to the way in which
data appeared in the patient records. A draft data collection tool form was peer reviewed by a General Practitioner, Pharmacy colleague and the Director of Nursing. It was piloted to ensure it was appropriate for collecting the required data. The pilot was conducted on a random sample of ten patients who were eligible for the study under the inclusion criteria. This process helped to gauge the ease of use and efficiency of the tool (Gregory and Radovinsky, 2010). Changes to the original data collection tool were necessary so data for these patients was recollected using the modified tool.

A standard operating procedure (SOP) was devised and used by the data collector to ensure data was abstracted in a consistent manner within and between all patients (Appendix 3).

The principle investigator was the sole data collector and 10% of data collected was validated by a colleague for quality assurance purposes, with no significant issues identified.

The Service Evaluation interview was peer reviewed by a General Practitioner and Pharmacy colleague before use.

2.5.5 Controls for Bias

2.5.5.1 Potential interviewer bias

As the interviewer is also the principle investigator there is potential for interview bias when conducting interviews with General Practitioners. In attempt to overcome such bias the interviewer must speak in a neutral, non-judgemental manner. The interviewer must ask questions in a non-biasing and non-leading way.
2.5.6 Data Management

Data was collected using paper form and did not contain any information that would allow identification of research participants such as; name, address, date of birth or hospital number. Each participant was allocated a unique ID number which was recorded on the data collection form. Patient’s names and corresponding ID numbers were stored separately to patients’ details in a password protected file on an encrypted laptop and consulted when necessary.

The data collection forms were stored in a locked cupboard when not in use. Access to this department is restricted to the principle investigator who will have sole access to the key of the locked cupboard.

Data on participants which was stored electronically on Microsoft Word® and Excel® (Microsoft Corp.) 2003 was stored according to the provisions of the Data Protection Act.

2.6 Data Analysis

2.6.1 Quantitative

All data was entered onto Microsoft Excel spreadsheets. 10% of data entry (10 patients) was checked by a colleague and found to be accurate.

Analysis was preformed using Microsoft Excel® (Microsoft Corp.) 2003. Descriptive statistics were used to analyse the data collected.
2.6.2 Qualitative

General practitioners perspectives on key topics (Appendix 6) were analysed logically and systematically for key concepts and themes. Notes from individual interviews were transcribed and organised to give an overall picture of the complete set of data. The data set was then assessed for different types of responses and themes. Finally, the dataset was interpreted and summarised to represent all opinions and views expressed in the interviews.
3.0 Results

3.1 Demographics

Figure 4: Population and gender distribution by age category in Birr Community Nursing Units (n=69)

In Birr Community Nursing Unit, twenty three patients (33.3%) were male and forty six (66.6%) were female. The median age of the group was 86 years (IQR 66-103). There were more females than males in all age categories apart from the 75-79 year old category and 100-105 year old category (Figure 4).

In Edenderry Community Nursing Unit, five patients (14.7%) were male and twenty eight (82.3%) were female. The median age of the group was 88 years (IQR 75-101). In all age categories there were more females than males. (Figure 5).
The total number of residents in the study was 103, 69 (67%) residents from Birr and 34 (33%) residents from Edenderry Community Nursing Unit. Twenty eight patients (27.2%) were male and seventy five (72.8%) were female. The median age of the entire group was 86 years (IQR 66-103). The 85-89 year old age category had the highest proportion of residents (29.1%) followed by the 80-84 year old category (21.3%). There were equal numbers of male and female residents in the 75-79 and the 100-105 age categories. In all other age categories there were more female than males (Figure 6).
3.2 Number of regular medicines prescribed.

Figure 6: Population and gender distribution by age category in Birr and Edenderry Community Nursing Units (n=103).

Figure 7: Number of regular medicines prescribed in Birr Community Nursing Unit.
The total number of regular medicines prescribed in Birr was 597 and all patients were prescribed between 1 and ≥15 medicines. The median number of medicines prescribed was 9 per patient.

13 patients (18.8%) were prescribed 1 to 5 medicines, 38 patients (55.2%) were prescribed 6 to 10 medicines, 17 patients (24.6%) were prescribed 11 to 15 medicines and 1 patient (1.4%) was prescribed more than 15 medicines (Figure 7).

![Figure 7: Number of regular medicines prescribed in Edenderry Community Nursing Unit.](image)

The total number of regular medicines prescribed in Edenderry Community Nursing Unit was 287 and all patients were prescribed between 1 and ≥15 medicines. The median number of medicines was 9 per patient.

7 patients (20.5%) were prescribed 1 to 5 medicines, 22 patients (64.7%) were prescribed 6 to 10 medicines, 4 patients (11.7%) were prescribed 11 to 15 medicines and 1 patient (2.9%) was prescribed more than 15 medicines (Figure 8).
Figure 9: Number of regular medicines prescribed in Birr and Edenderry Community Nursing Units.

The total number of regular medicines prescribed in both Birr and Edenderry was 884, and all patients were prescribed between 1 and ≥15 medicines. The median number of medicines prescribed for the whole dataset was 9 per patient. 20 patients (19.4%) were prescribed 0 to 5 medicines, 60 patients (58.3%) were prescribed 6 to 10 medicines, 21 patients (20.3%) were prescribed 11 to 15 medicines and the remaining 2 patients (1.9%) were prescribed more than 15 medicines (Figure 9).
3.3 Number of Potentially Inappropriate Medicines (PIMs) in Birr Community Nursing Unit.

The total number of PIMs prescribed in Birr according to STOPP/START was 117 which represents almost one fifth (19.5%) of the total number of regular medicines prescribed (n=597). 50 patients (72.5%) had at least one potentially inappropriate medicine prescribed at the point of medication review. 57% (40) of patients had one or more PIM related to STOPP, while 40.5% (28) of patients had one or more PIMs related to START. 28.9% (20) of patients had one or more PIMs related to both STOPP and START. One patient had more than 5 PIMs prescribed (Table 4).

Table 4: Incidence of Potentially Inappropriate Medicines (PIMs) in Birr Community Nursing Unit (n=69).

<table>
<thead>
<tr>
<th>Number of PIMs</th>
<th>Number patients</th>
<th>% of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>19</td>
<td>27.5</td>
</tr>
<tr>
<td>1</td>
<td>14</td>
<td>20.2</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>14.5</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>4.3</td>
</tr>
<tr>
<td>&gt;5</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Figure 10: Potentially Inappropriate Medicines (PIMs) in Birr Community Nursing Unit according to STOPP categorised by physiological system.

Figure 11: Potential Prescribing Omissions (PPOs) in Birr Community Nursing Unit according to START categorised by physiological system.

3.3.1 Outcome of pharmacist recommendations in Birr Community Nursing Unit.

In Birr Community Nursing Unit, 62.4 % (73) of PIM involved use of medicines that had unfavourable risk benefit ratio in particular patients.
(according to STOPP) and 37.6% (44) were instances of PIM through omission of a potentially beneficial medicine (according to START). Drugs acting on the CVS (Cardiovascular system), CNS (Central nervous system), GIT (Gastro-intestinal tract), RT (Respiratory Tract) and MS (Musculoskeletal system) were all implicated as well as drugs that are unsuitable for use in patients with a history of falls and duplication of therapy (Figure 10 & 11).

![Figure 12](image-url)

**Figure 12: Outcome of pharmacist recommendations in Birr Community Nursing Unit.**

Of the 117 recommendations made by the pharmacist based on STOPP/START, 42.7% (50) were accepted and implemented by the General Practitioners in Birr Community Nursing Unit. 51% (37) of STOPP recommendations were accepted and 30% (13) of START recommendations were accepted. 49% (34) of STOPP recommendations were declined, there was a valid reason in 41% of cases. 75% (33) of START recommendations were declined with reason. Of all the
recommendations declined 57.3% (67) a valid reason was provided in 94% (63) of cases (Figure 12).

3.4 Number of Potentially Inappropriate Medicines in Edenderry Community Nursing Unit.

The total number of PIMs prescribed in Edenderry according to STOPP/START was 87 which represents 30.3% of the total number of medicines prescribed (n=287). Twenty eight patients (82.4%) had at least one potentially inappropriate medicine prescribed at the point of review. 70.5% (24) of patients had one or more PIM related to STOPP, while 41% (14) of patients had one or more PIMs related to START. Twelve (35.3%) of patients had one or more PIMs related to both STOPP and START. Two patients had greater than 5 potentially inappropriate medicines (Table 5).

Table 5: Incidence of Potentially Inappropriate Medicines (PIMs) in Edenderry Community Nursing Unit (n=34).

<table>
<thead>
<tr>
<th>Number of PIMs</th>
<th>Number patients</th>
<th>% of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6</td>
<td>17.6</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>14.7</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>17.6</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>26.5</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>8.8</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>8.8</td>
</tr>
<tr>
<td>&gt;5</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>100.0</td>
</tr>
</tbody>
</table>
In Edenderry Community Nursing Unit, 68.9 % (60) of PIM involved use of medicines that had unfavourable risk benefit ratio in particular patients (according to STOPP) and 31.1% (27) were instances of PIM through omission of a potentially beneficial medicine (according to START). Drugs
acting on the CVS, CNS, GIT, RT and MS were all implicated as well as drugs that are unsuitable for use in patients with a history of falls (Figure 13&14)

3.4.1 Outcome of Pharmacist recommendations in Edenderry Community Nursing Unit.

![Bar chart showing the outcome of pharmacist recommendations in Edenderry Community Nursing Unit.]

**Figure 15: Outcome of pharmacist recommendations in Edenderry Community Nursing Unit.**

Of the 87 recommendations made by the pharmacist based on STOPP/START, 51.7% (45) were accepted and implemented by the General Practitioners. 50% (30) of STOPP recommendations were accepted and 56% (13) of START recommendations were accepted. 50% (30) of STOPP recommendations were declined, there was a valid reason in 45% (27) of cases. 44% (12) of START recommendations were declined with reason. Of all the recommendations declined (48.3%), a valid reason was provided in 92.8% (39) of cases (Figure 15).
3.5 Number of Potentially Inappropriate Medicines (PIMs) in Birr and Edenderry Community

Table 6: Incidence of Potentially Inappropriate Medicines (PIMs) in Birr and Edenderry Community Nursing Unit (n=103).

<table>
<thead>
<tr>
<th>Number of PIMs</th>
<th>Number patients</th>
<th>% of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>25</td>
<td>24.3</td>
</tr>
<tr>
<td>1</td>
<td>19</td>
<td>18.4</td>
</tr>
<tr>
<td>2</td>
<td>24</td>
<td>23.3</td>
</tr>
<tr>
<td>3</td>
<td>19</td>
<td>18.4</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>6.8</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>5.8</td>
</tr>
<tr>
<td>&gt;5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The total number of PIMs prescribed overall according to STOPP/START was 204. 75.7% (78) of patients had at least one potentially inappropriate medicine prescribed at the point of medication review (Table 6). 62% (64) of patients had one or more PIM related to STOPP, while 42% (44) of patients had one or more PIMs related to START. 31% (32) of patients had one or more PIMs related to both STOPP and START. Three patients had more than 5 PIMs.
Figure 16: Potentially Inappropriate Medicines (PIMs) in Birr and Edenderry Community Nursing Units according to STOPP categorised by physiological system.

On review of both dataset, 65.2%(133) of PIM involved use of medicines that had unfavourable risk benefit ratio in particular patients (according to STOPP) and 34.8% (71) were instances of PIM through omission of a
potentially beneficial medicine (according to START). Drugs acting on the CVS, CNS, GIT, RT and MS were all implicated as well as drugs that are unsuitable for use in patients with a history of falls and duplication therapy (Figure 16&17).

3.5.1 Outcome of Pharmacist recommendations in Birr and Edenderry Community Nursing Units.

![Figure 18: Outcome of pharmacist recommendations in Birr and Edenderry Community Nursing Units.](image)

Of the 204 recommendations made by the pharmacist based on STOPP/START 46.6% (95) were accepted and implemented by the General Practitioners in Birr and Edenderry Community Nursing Unit. Of all the recommendations declined (53.4%) a valid reason was provided in 93.5% (102) of cases (Figure 18).
Table 7: Examples of STOPP/START recommendations implemented in Birr and Edenderry Community Nursing Units.

<table>
<thead>
<tr>
<th>Physiological system</th>
<th>STOPP (Criteria &amp; Example)</th>
<th>START (Criteria &amp; Example)</th>
</tr>
</thead>
</table>
| **GIT**               | • Patient on lansoprazole 30mg at full therapeutic dose > 8 weeks.  
                         • Pantoprazole 40mg > 8 weeks, no history of PUD, reduce to 20mg daily. | |
| **Falls**             | • Patient with history of falls and high falls risk on Diazepam 2mg qds and Nitrazepam 5mg at night. Discontinue gradually.  
                         • Prazepam 10mg at night in patient with osteoporosis and high falls risk. Discontinue gradually.  
                         • Long term neuroleptics (i.e. >1 month) as long term hypnotics, Quetiapine 25mg nocte reduced to 12.5mg nocte with aim to discontinue. | |
| **Musculoskeletal System** | • Nabumetone 500mg twice daily long term (>3 months) for symptom relief of mild osteoporosis. Discontinue. | • Bisphosphonate (Bondronate) and Calcium&Vitamin D supplement in patients on maintenance prednisolone and known osteoporosis |
| **Respiratory system** | • Systemic | • No regular inhaled $\beta_2$ |
corticosteroids instead of inhaled corticosteroids for maintenance therapy in moderate COPD: stop Prednisolone 5mg and start budesonide 0.5mg nebulised twice daily.

agonist or anticholinergic agent for Chronic Obstructive Pulmonary Disease (COPD): Start Combivent (Salbutamol/ipratropium)

3.6 Non-STOPP/START pharmacist recommendations implemented in Birr and Edenderry Community Nursing Units.

Figure 19 below categorises the 60 additional non-STOPP/START pharmacy recommendations which were implemented during the review process.

Figure 19: Non-STOPP/START pharmacy recommendations implemented in Birr and Edenderry Community Nursing Units.
Examples from each category can be seen in table 8 below. A quarter of the recommendations related to the duration of therapy, while an additional 20% of cases related to medication implicated in falls i.e. antihypertensive, anti-diabetic medication which is not specifically cover in the STOPP/START criteria. Other recommendations included optimising doses, reviewing therapeutic need and discontinuation of prophylactic antibiotics.

Table 8: Examples of non-STOPP/START pharmacy recommendations implemented in Birr and Edenderry Community Nursing Units.

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of patients</th>
<th>Example</th>
</tr>
</thead>
</table>
| Optimal dose         | 6                  | • One 90 year old lady on Escitalopram 20mg daily reduced to 10mg daily (> 65 years maximum dose =10mg daily)  
• Four patients on Donepezil 5mg daily, dose increased to 10mg daily on review.  
• One patient prescribed regular prochlorperazine for vertigo, discontinued as not recommended in elderly. |
| Therapeutic need     | 6                  | • One patient who started Sinemet as a trial 10 years ago but showed no signs of parkinsons had this medication discontinued. |
| Antibiotics          | 3                  | • Three patients receiving prophylactic antibiotics, antibiotic discontinued. |
| Renal Impairment     | 3                  | • One patient receiving full dose memantine with GFR < 30ml/min had her dose reduced to 10mg daily (Renal dose)  
• Two patients taking Pentoxifylline, had their doses reduced or discontinued as appropriate. |
<p>| Hepatic Impairment   | 1                  | • One patient with deranged liver function tests had his Atorvastatin... |</p>
<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain management</td>
<td>1</td>
<td>One patient who discontinued a non-steroidal anti-inflammatory had her pain assessed and initiated topical non-steroidal anti-inflammatory plus pregabalin for nerve type pain.</td>
</tr>
<tr>
<td>Frequency</td>
<td>7</td>
<td>One patient taking Sinemet twice daily had the frequency optimised to four times daily. One patient taking galantamine 12mg twice daily was changed to galantamine XL 24mg daily. Two patients taking memantine 10mg twice daily had their dose optimised to 20mg daily.</td>
</tr>
<tr>
<td>Formulation</td>
<td>5</td>
<td>Two patients had their Venlafaxine XL once daily preparation changed to Venlafaxine twice daily which may be crushed for administration due to swallowing difficulties. Inhaler changed to nebuliser formulation to enhance therapeutic benefit.</td>
</tr>
<tr>
<td>Falls</td>
<td>13</td>
<td>Ten patients with high falls risks had their antihypertensive medication reduced or discontinued due to persistently low blood pressure over a period of months. Three patients with high falls risk had their anti-diabetic medication reduced or discontinued due to persistently low blood glucose readings over a period of months.</td>
</tr>
<tr>
<td>Duration of therapy</td>
<td>15</td>
<td>Fourteen patients had their Iron supplement reduced or discontinued as they had received a therapeutic dose for over 6 months or their latest haemoglobin reading was now in range. One patient taking letrozole 2.5mg daily for the last ten years had her therapy discontinued.</td>
</tr>
</tbody>
</table>
3.7 Prevalence of Potentially Inappropriate Prescribing.

![Graph showing potentially inappropriate medicines (PIMs) as a percentage of number of medicines per category in Birr and Edenderry Community Nursing Units (n=103)](image)

**Figure 20:** Potentially Inappropriate Medicines (PIMs) as a percentage (%) of number of medicines per category in Birr and Edenderry Community Nursing Units (n=103)

As illustrated in Figure 20 the number of PIMs as a percentage of the number of medicines in each category reaches a peak in group of patients who took 1 to 5 medicines. The percentage of PIMs declines gradually from 24% in the patients taking 6 to 10 regular medicines to 18% in those taking 11 to 15 regular medicines. It then spikes again to 29% in those taking >15 regular medicines.
Figure 21: STOPP and START Potentially Inappropriate Medicines (PIMs) as a percentage of the total number of medicines per category in Birr and Edenderry Community Nursing Units (n=103).

As illustrated in Figure 21, 24% of PIMs in the 1 to 5 medicines category are related to START almost double those related to STOPP (13%) in this category. In contrast 7% of PIMs are related to START in the 5 to 10 medicines category which is less than half of the PIMs which were attributable to STOPP (17%). The number of PIMs related to STOPP and START decline to 13% and 5% respectively in the 11 to 15 medicines group but PIMs relating to STOPP still outnumber those relating to START in this group and in the >15 medicines group.
3.8 Qualitative results

Question 1

Is STOPP/START acceptable as a clinical pharmacy service?

All General practitioners interviewed in Birr and Edenderry Community Nursing Units felt the service was acceptable. A recurring theme was the fact that the service helps them to meet their mandatory obligation to review residents’ medication every three months as set down by HIQA’s National standards for residential care setting for older people in Ireland. One General practitioner felt the service was wonderful:

‘Wonderful. We haven’t had any clinical pharmacy input in this nursing unit. The service is very well organised and most welcome to ensure we meet the required standard of three monthly reviews for all our residents. Looking forward to having the service permanently’.

Question 2

Does STOPP/START as a clinical pharmacy service aid completion of 3 monthly medication reviews?

Each General Practitioner agreed the service aids completion and documentation of three monthly medication reviews.

‘Yes. The first review will obviously be the hardest but after that it should be a matter of building on previous work and changing the prescription to meet the patient’s changing requirements. It is helpful as a method of documentation and proof that the review has been conducted. The
addition of a clinical pharmacist in the review process gives additional expertise to pick up on any potential drug interactions or changes in current practice.’

Question 3

Is it feasible to introduce STOPP/START as a clinical pharmacy service in other community nursing units in the region?

Again all respondents believed it would be feasible to introduce the service in other Community Nursing Units in the region:

‘I think it should be feasible. It shouldn’t make any difference which GP you work with, the patients will benefit ultimately. One on one discussion is preferably, as correspondence notes can sometimes lead to a time lag and there can be some confusion about recommendations. GPs and Pharmacists usually can come to a faster commonsense conclusion when working together.’

Question 4

Perceived barriers to the introduction of STOPP/START as a pharmacy service in Birr CNU and other community nursing units in the region?

A number of barriers to the introduction of the service were mentioned; hospital pharmacy manpower, time and defensive General Practitioners.

‘Chiefly manpower from the hospital pharmacy perspective there is no one else in this role at present…Community Pharmacists may pay visits to
nursing homes but without consulting the medical notes or monitoring patients clinical parameters it is difficult for them to make recommendations to the GP.’

‘Time may also be a perceived barrier for GPs. I feel the first review will be the most time consuming but after that it should be ok, our pharmacist is flexible and willing to organise the reviews in a timely manner. If it’s only every 3 months it should be fine.’

‘If GP’s are defensive and feel the pharmacist is questioning their ability this may be a barrier to introducing the service. I don’t feel that way at all, I am very open to suggestion. I feel the pharmacist is an extra pair of eyes and another healthcare professional giving advice from their perspective. Doctors and pharmacists clinical opinion won’t be a million miles apart. I can’t think of any other barriers.’

Question 5

Have you any recommendations to improve acceptability of STOPP/START as a clinical pharmacy service to facilitate completion of 3 monthly reviews.

A recurring theme was the fact that General Practitioners found that the service was time efficient and acceptable in its current format. A number of General Practitioners felt the first review would be the hardest and most time consuming with subsequent reviews building on initial findings. General Practitioners felt the screening tool flags up certain recommendations which may not be practical for certain patients so the
discussion and decision making process with the pharmacist for each individual is an essential element to the service.

‘I think the first review will probably be the hardest but once the time for the review is prearranged and scheduled it shouldn’t be a problem to attend and complete subsequent reviews. The screening tool flags up certain recommendations which may not be practical for certain patients i.e. bisphosphonates in dysphagic patients so the implicit discussion and decision making with the pharmacist is also an essential part of the service. Consulting the nurses for certain patients particularly when considering reducing doses of benzodiazepines is also an important part of the review process.
4.0 Discussion

4.1 Interpretation of findings and comparison with literature

Of the residents included in this study (n=103), 72.8% were female. This gender distribution is a characteristic of most long term care facilities in Ireland (Byrne et al. 2010) and the rest of Europe (Fialovà et al. 2005, Lang et al. 2010).

The residents were very old, the median age of the entire dataset in this study was 86 years (IQR: 66-103) again closely matched with other Irish long term care facilities where the median age was 84 years (IQR 78-89) (Byrne et al. 2010).

The total number of regular medicines prescribed overall was 884 (Median 9). The majority (58.3%) of resident were prescribed 6 to 10 regular medicines. These findings reflect results from an evaluation of inappropriate prescribing in similar long term care facilities in Ireland (Byrne, S et al. 2010) where the median number of regular medicines prescribed was eight. In the UK the average number of medicines taken by nursing home residents is between six and seven, with over 20% of patients using more than 10 medications (Furniss et al. 2000, Loganathan et al. 2011).

Seventy eight (75.7%) patients had at least one potentially inappropriate medicine (PIM) or prescribing omission identified by STOPP and START criteria. Sixty four (62%) residents had at least one potentially inappropriate medication (PIM) identified by STOPP criteria and forty four
(42%) residents had at least one potential prescribing omission (PPO) identified by START. Thirty two (31%) patients had one or more PIMs related to both STOPP and START.

Potentially inappropriate medicine prescribing rates of between 57% and 75% have been detected in other Irish and European long term care facilities using the STOPP criteria (Byrne et al. 2008, Ryan et al. 2009c, Kruse et al. 2010).

Potential prescribing omission rates of between 65% and 84% have been detected in Irish and European Long term care facilities using START criteria (Kruse et al. 2010, Lang et al. 2010).

Polypharmacy has been identified in the literature as a significant predictor of the prevalence of inappropriate prescribing (Byrne et al. 2010, Cahir et al. 2010, Carey et al. 2008, Lang et al. 2010).

**Figure 20** illustrates the prevalence of Potentially Inappropriate Medicines (PIMs) as the total number of medicines prescribed increases. The prevalence of PIMs peak in the group of residents taking 1 to 5 medicines with PIMs (STOPP and START) accounting for 37% of all regular medicines this may be explained by the fact that 24% of PIMs are actually related to prescribing omission or START PIMs and only 13% of PIMs are related to STOPP PIMs (**Figure 21**). A study evaluating the relationship between inappropriate prescribing, medication underuse and the number of medicines used by older people found that patients using less than six regular medications were more likely to be missing a potentially beneficial drug than to be taking a medication considered inappropriate (Steinman et
al. 2006). This finding is reflected in the ratio of STOPP/START PIMs (13%:24%) in the 1 to 5 medicines category of this study. In the group of residents taking 6 to 10 medicines the prevalence of PIMs (STOPP and START) drops to 24% of all regular medicines. This is noteworthy as the majority of residents (58.3%) take between 6 and 10 regular medicines. This figure actually represents an increase in PIMs detected by STOPP (from 13% to 17%) and a dramatic decline in the number of PIMs detected by START (24% to 7%). These findings are in accordance with other research linking polypharmacy as a factor strongly associated with STOPP criteria (Cahir et al. 2010, Lang et al. 2010, Steinman et al. 2006).

Steinman’s research found that the link between the number of medicines and the frequency of inappropriate medicine use persisted in multivariable analysis that controlled for confounders such as age and diagnoses but remained unassociated with the frequency of medicine under use. The primary factor associated with the presence of START criteria (medicine under use) was a lack of health literacy concerning geriatric conditions in those caring for patients in long term care facilities (Lang et al. 2010). Health literacy is broadly defined as the ability of individuals to access and use health information to make appropriate health decisions. Lack of knowledge can lead the prescriber(s) to either simply add medication or omit treating essential comorbidity (Lang et al. 2010).

A comparison of the percentage of inappropriate medicines in Birr (19.5%) and Edenderry (30.3%) highlights the fact that there were over ten percent more inappropriately prescribed medicines in Edenderry Nursing Unit. This is an interesting finding and may reflect the impact of the clinical pharmacy
service already in existence in Birr Community Nursing Unit prior to the introduction of STOPP/START as a clinical pharmacy service. The results also highlight the substantially higher percentage of STOPP PIMs in Edenderry (70.5%) versus Birr (57%). Unfortunately, as the populations in each nursing unit were not matched it is difficult to make assumptions about the impact the previous clinical pharmacy service in Birr had on inappropriate prescribing.

Ninety five (46.6%) recommendations were accepted and implemented by General Practitioners participating in the study. Of all recommendations declined (53.4%) a valid reason was provided in 93.5% (102) of cases. This acceptance rate does not take into account non-STOPP/START recommendations which were all accepted and implemented by GPs. Inclusion of pharmacist non-STOPP/START recommendations would bring the overall acceptance and implementation rate by GPs to 59%. A study conducted by Zermansky et al. in 2006 found that GP’s accepted and implemented 57% (433/747) of pharmacist recommendations. One reason for the lower acceptance and implementation rate in this study was suggested by a GP when asked about barriers to STOPP/START as a clinical pharmacy service in the post service implementation interview;

‘The screening tool flags up certain recommendations which may not be practical for certain patients i.e. bisphosphonates in dysphagic patients so the implicit discussion and decision making with the pharmacist is also an essential part of the service.’
This sentiment reflects findings that explicit criteria such as the STOPP/START screening tool do not take into account all factors that define high quality health care for the individuals. The START screening tool for potential prescribing omissions does not allow for factors such as life expectancy, time needed to derive clinical benefit and patient preference as legitimate reasons for under prescribing (Spinewine et al. 2007). As highlighted in the post service interview STOPP/START alone cannot fully substitute for comprehensive clinical and pharmacological review of medications and both explicit and implicit methods must be rationally combined in individualised drug treatments (Fialova et al. 2009).

Concerning STOPP criteria, the most frequent drugs prescribed inappropriately are benzodiazepines (19.6%) and proton pump inhibitors (21%).

Inappropriate benzodiazepines use comprised almost one fifth (19.6%,n=40) of all instances of PIP in Birr and Edenderry i.e. breach of criteria related to long term use of long acting benzodiazepines (B7) and use of benzodiazepines in individuals with a history of falls (H1).

Inappropriate prescribing of benzodiazepines in older patients has been highlighted repeatedly in the literature over the last 25 years, in particular given the link with falls and fracture risk and the difficulty with successful withdrawal (Parr et al. 2009, Pimlott et al. 2003; Wang et al. 2001). Despite this, benzodiazepines continue to be initiated and repeatedly prescribed for older patients in primary and secondary care in Ireland and
other countries (De Wilde et al. 2007; Rajska-Neumann et al. 2007; Ryan et al. 2009c;). These realities suggest that benzodiazepines should not be initiated in older patients, given their high propensity for psychological and physical dependency (Chuka et al. 2004; Mangoni et al. 2004). It has been widely documented that the use of benzodiazepines in individuals already predisposed to falls can further contribute to future falls. This occurs primarily due to the CNS sedative effect of this class of medications but may also be due to their muscle relaxant properties, which can lead to weakening of the muscles of the lower back and upper legs, therefore directly affecting a resident’s stability. This medication class can often prove quite problematic in older individuals who already exhibit a lower level of stability (Landi et al. 2005; Pariente et al. 2008). Withdrawal of long-term benzodiazepine use is limited by dependence problems but gradual discontinuation programmes and intervention strategies have been shown to be successful (Cahir et al. 2010).

Over one fifth (21%) of all PIMs were associated with the use of high dose proton pump inhibitors (PPI’s) (13% in Birr and 8% in Edenderry). It may be argued that long-term, high-dose PPI treatment in older people is relatively harmless in terms of ADEs and this may be true in practice. However, a number of relatively rare but potentially important ADEs have been identified as being associated with this class of medications. Yang et al. found that long-term use of PPIs at high doses was associated with an increased risk of hip fracture, due to interference with calcium absorption and bone resorption (Yang et al. 2006). PPIs are also associated with an
increased risk of infection with Clostridium difficile (Dial et al. 2005). The inappropriate use of long term PPIs is one of international concern. In a review conducted by Forgas et al., the authors stated that 64% of hospital inpatients in Australia, 33% of hospital patients in Ireland and 65% of hospital patients in the UK, were taking PPIs outside the countries’ licensed indication for the medication (Forgacs et al. 2008).

There has been little research on the costs of potentially inappropriate prescribing in relation to the overall government pharmaceutical expenditure. However, in 2010 Cahir et al. published a retrospective national population study (n=338801) using the Health Service Executive Primary Care Reimbursement Service (HSE-PCRS) pharmacy claims database. Thirty STOPP criteria were applied to the prescription claims for those ≥ 70 years which resulted in a PIP prevalence of 36%. The main contributors to this were proton pump inhibitors (17%) at maximum therapeutic dose for > 8 weeks, non-steroidal anti-inflammatories (9%) for > 3 months, long-acting benzodiazepines (5%) for > 1 month and duplicate drugs (5%). The study established that the total cost of potentially inappropriate prescribing was estimated to be €45,631319, 9% of the overall expenditure on pharmaceuticals in those ≥ 70 years in 2007. In another study the cost of inappropriate medicines was valued at €356 per older person in the republic of Ireland (Byrne et al. 2010). In the current climate of major fiscal pressure on health resources, continuation of high-dose PPI treatment without clear indication is expensive and almost always unnecessary.
Failure to prescribe bisphosphonates and Calcium/Vitamin D supplements when indicated according to START accounted for 26% (55) of the total instances of PIP in the study (16% in Birr and 10% in Edenderry). Over 75% of all START recommendations related to the omission of bisphosphonates in patients taking maintenance steroid or calcium and Vitamin D supplementation in patients with known osteoporosis or previous fragility fracture. Prednisolone is among the list of drugs most likely to cause hospital admission in the United Kingdom and osteoporotic fracture is one of the ADEs that commonly lead to admission (Pirmohamad et al. 2004). Cannet et al. (2002) named corticosteroids as the leading cause of secondary osteoporosis and highlighted the fact that treatment with such drugs for longer than 3 months, even at low doses results in considerable bone loss. They, along with others recommend bisphosphonates as the treatment of choice to prevent bone loss (Homik et al. 1999, Buckley et al. 2001). Despite the fact that bisphosphonates have a good safety profile and proven efficacy there was a very low level of implementation only 25% (18) of all recommendations were implemented. The screening tool flagged up this recommendation however in many instances the patients may have had poor swallow or posture and it was believed that the overall risk of prescribing a bisphosphonate and calcium supplementation outweighed the benefit particularly in very old and immobile patients. Also, when patient parameters were taken into consideration during the pharmacist/GP consultation it was clear that some patients disliked these preparations
from previous experience and would not like reinitiation of therapy even if indicated.

An additional sixty non-STOPP/START pharmacy recommendations were implemented during the review process (Table 8), these included recommendations in relation to formulation, duration of therapy, antibiotics and falls. 20%(n=13) of non-STOPP/START pharmacy recommendations were related to falls (Figure 19). Although STOPP/START criteria includes a number of drugs classes that adversely effect fallers (Benzodiazepine, Neuroleptics, first-generation antihistamines, Vasodilator drugs in postural hypotension, Long-term opiates), other drug classes not included in the criteria may also have pharmacological effects that can increase the risk of falling (Riefkohl, E.Z et al. 2003). During the pharmacist/GP consultation all laboratory results and clinical observations were review bearing the patients current medication history in mind. If the patient had a high falls risk and persistently low blood pressure or blood glucose readings in the preceding months a decision was made to stop or reduce antihypertensive or hypoglycaemic agents (Table 8).

4.2 Limitations

This study had several limitations. The power of the study was limited due to the small sample size. A much larger randomised controlled trial would be required in order to fully quantify the prevalence of Potentially Inappropriate Medicines (PIMs). It was not possible to compare results in
Birr and Edenderry Nursing Units as the sample populations were not matched.

The study was not designed to show the effect of STOPP/START as a clinical pharmacy service on health outcomes such as falls and hospitalisation.

This study did not calculate the medication savings or medication costs of STOPP/START as a clinical pharmacy service. Data on the number of when required medicines was collected but not included in the data analysis.

A major drawback of this study was that the medicines identified as inappropriate according to set criteria were potentially inappropriate and the residents were not actually examined to determine if there was any level if harm evident from the PIM identified.

4.3 Recommendations for Future Practice

While no Residential Care Unit has yet been convicted for failure to comply with the Medication Monitoring and Review Standard of HIQA’s National Quality Standards for Residential Care Settings for Older People in Ireland. It is envisaged that once HIQA have completed the registration process for Residential Care Units in Ireland if registered Residential Care Units are found to be non-compliant with these standards they may well face legal proceedings. There is potential to develop and expand a Clinical Pharmacy Service to ensure the Medication Monitoring and Review Standard is met for all Residential Care Units in the HSE Dublin-Mid-Leinster region.
4.4 Recommendations for Future Research

It is apparent from the literature that clinical medication review of elderly residents living in the residential care setting leads to a reduction in medications prescribed and generates cost savings as well as improved health outcomes (Loganathan et al. 2010). This study aimed to implement STOPP/START as a clinical pharmacy service and evaluate GP satisfaction with the service. However, future studies may calculate the pharmaceutical savings and improved health outcomes such a service may provide.

Hughes and Lapane investigated the impact of legislation on nursing home care in the United States and found that after legislation, psychotropic drugs were used less and a more structured approach to care planning was observed (Hughes & Lapane, 1999). It would be interesting to investigate the impact of the Irish Health Information and Quality Authority’s Medication Monitoring and Review Standard (which sets down in law that each resident on long term medication should be reviewed by his/her medical practitioner on a three monthly basis in conjunction with the nursing staff and pharmacist) on inappropriate prescribing in the elderly residential care setting.

This study looked at the acceptability of STOPP/START as a clinical pharmacy service to General Practitioners providing a medical service to the long term care facilities involved in the study. It would be interesting to gather some qualitative data on nursing staff and resident’s acceptance of and attitudes towards the service.
5.0 Conclusion

Implementation of STOPP and START as a clinical pharmacy service in an elderly Community Nursing unit population facilitates the three monthly medication reviews required to meet the Health Information and Quality Authority’s medication monitoring and review standard. Implementation of STOPP and START as a clinical pharmacy service in an elderly Community Nursing Unit population reduces the level of inappropriate prescribing.

The implicit decision making process between the pharmacist and General Practitioner before an explicit STOPP/START recommendation is executed is an essential part of the clinical pharmacy service.

STOPP and START as a clinical pharmacy service is acceptable to General Practitioners providing a medical service in Birr and Edenderry Community Nursing Unit.

STOPP and START as a clinical pharmacy service has potential for implementation in other Community Nursing Units in the Dublin Mid-Leinster Region.


6.0 Bibliography


Byrne, S., O’Mahoney, D., Hughes, C., Parsons, C., Patterson, S., McCormack, B. and Finn, F. (2010). An evaluation of the inappropriate prescribing in older residents in long term care facilities in the greater Cork and Northern Ireland regions using the STopp and Beers’ criteria. *Centre for Ageing Research and Development in Ireland*.


Research methods in health. Section V Qualitative and combined research methods, and their analysis Ann Bowling Second Edition 2003


APPENDIX 1: STOPP: Screening Tool of Older People’s potentially inappropriate Prescriptions

The following drug prescriptions are potentially inappropriate in persons aged > 65 years of age.

A. Cardiovascular System

1. Digoxin at a long-term dose >125 microgram/day with impaired renal function*(increased risk of toxicity).
2. Loop diuretic for dependent ankle oedema only i.e. no clinical signs of heart failure (no evidence of efficacy, compression hosiery usually more appropriate).
3. Loop diuretic as first-line monotherapy for hypertension(safer, more effective alternatives available).
4. Thiazide diuretic with a history of gout (may exacerbate gout).
5. Non cardioselective Beta-blocker with Chronic Obstructive Pulmonary Disease(COPD) (risk of increased bronchospasm).
7. Use of diltiazem or verapamil with NYHA Class III or IV heart failure (may worsen heart failure).
8. Calcium channel blockers with chronic constipation (may exacerbate constipation).
9. Use of aspirin and warfarin in combination without histamine H2 antagonist (except cimetidine because of interaction with warfarin) or Proton Pump Inhibitor (PPI) (high risk of gastrointestinal bleeding).
10. Dipyridamole as monotherapy for cardiovascular secondary prevention (no evidence for efficacy).
11. Aspirin with a past history of peptic ulcer disease without histamine H2 antagonist or PPI(risk of bleeding).
12. Aspirin at dose >150mg per day (increased bleeding risk, no evidence for increased efficacy).
13. Aspirin with no history of coronary, cerebral or peripheral vascular symptoms or occlusive event (not indicated).
14. Aspirin to treat dizziness not clearly attributable to cerebrovascular disease (not indicated).
15. Warfarin for first, uncomplicated deep vein thrombosis for > 6 months’ duration (no proven added benefit).
16. Warfarin for first uncomplicated pulmonary embolus for > 12months’ duration (no proven benefit).
17. Aspirin,clopidogrel,dipyridamole or warfarin with concurrent bleeding disorder(high risk of bleeding).

*Serum creatinine >150µmol/L, or estimated glomerular filtration rate(GFR) <50ml/min.

B. Central Nervous System and Psychotropic Drugs

1. Tricyclic antidepressants (TCA’s) with dementia (risk of worsening cognitive impairment).
2. TCA’s with glaucoma (likely to exacerbate glaucoma).
3. TCA’s with cardiac conductive abnormalities (pro-arrhythmic effects).
4. TCA’s with constipation *(likely to worsen constipation).*
5. TCA’s with opiate or calcium channel blocker *(risk of severe constipation).*
6. TCA’s with prostatism or prior history of urinary retention *(risk of urinary retention).*
7. Long term (i.e. > 1 month), long-acting benzodiazepine e.g. chlordiazepoxide, flumazenil, nitrazepam, chlorazepate and benzodiazepines with long-acting metabolites e.g. diazepam *(risk of prolonged sedation, confusion, impaired balance, falls).*
8. Long-term (i.e. >1 month) neuroleptics as long-term hypnotics *(risk of confusion, hypotension, extra-pyramidal side effects, falls).*
9. Long-term neuroleptics (>1 month) in those with parkinsonism *(likely to worsen extra-pyramidal symptoms).*
10. Phenothiazines in patients with epilepsy *(may lower seizure threshold).*
11. Anticholinergics to treat extra-pyramidal side-effects of neuroleptic medications *(risk of anticholinergic toxicity).*
12. Selective serotonin re-uptake inhibitors (SSRI’s) with a history of clinically significant hyponatraemia *(non-iatrogenic hyponatraemia <130mmol/l within the previous 2 months).*
13. Prolonged use (>1 week) of first generation antihistamines i.e. diphenhydramine, chlorpheniramine, cyclizine, promethazine *(risk of sedation and anti-cholinergic side effects).*

**C. Gastrointestinal System**

1. Diphenoxylate, loperamide or codeine phosphate for treatment of diarrhoea of unknown cause *(risk of delayed diagnosis, may exacerbate constipation with overflow diarrhoea, may precipitate toxic megacolon in inflammatory bowel disease, may delay recovery in unrecognised gastroenteritis).*
2. Diphenoxylate, loperamide or codeine phosphate for treatment of severe infective gastroenteritis, i.e. bloody diarrhoea, high fever or severe systemic toxicity *(risk of exacerbation or protraction of infection).*
3. Prochlorperazine (Stemetil) or metoclopramide with parkinsonism.
4. PPI for peptic ulcer disease at full therapeutic dosage for > 8 weeks *(risk of exacerbation of Parkinsonism).*
5. Anticholinergic antispasmodic drugs with chronic constipation *(risk of exacerbation of constipation).*

**D. Respiratory System**

1. Theophylline as monotherapy for COPD *(safer, more effective alternative: risk of adverse effects due to narrow therapeutic index).*
2. Systemic corticosteroids instead of inhaled corticosteroids for maintenance therapy in moderate-severe COPD *(unnecessary exposure to long-term side-effects of systemic steroids).*
3. Nebulised ipratropium with glaucoma *(may exacerbate glaucoma).*

**E. Musculoskeletal System**
1. Non-steroidal anti-inflammatory drug (NSAID) with history of peptic ulcer disease or gastrointestinal bleeding, unless with concurrent histamine H2 receptor antagonist, PPI or misoprostol (risk of peptic ulcer relapse).
2. NSAID with moderate-severe hypertension (risk of exacerbation of hypertension).
3. NSAID with heart failure (risk of exacerbation of heart failure).
4. Long-term use of NSAID (> 3 months) for symptom relief of mild osteoarthritis (simple analgesia preferable and usually effective for pain relief).
5. Warfarin and NSAID together (risk of gastrointestinal bleed).
6. NSAID with chronic renal failure* (risk of deterioration in renal function).
7. Long-term corticosteroids (>3 months) as monotherapy for rheumatoid arthritis or osteoarthritis (risk of major systemic corticosteroid side-effects).
8. Long-term NSAID or colchicine for chronic treatment of gout where there is no contraindication to allopurinol (allopurinol first choice prophylactic drug in gout).

*Serum creatinine >150µmol/L, or estimated GFR 20-50ml/min

F. Urogestinal System

1. Bladder antimuscarinic drugs with dementia (risk of increased confusion, agitation).
2. Antimuscarinic drugs with chronic glaucoma (risk of acute exacerbation of glaucoma).
3. Antimuscarinic drugs with chronic constipation (risk of exacerbation of constipation).
4. Antimuscarinic drugs with chronic prostatism (risk of urinary retention).
5. α-Blockers in men with frequent incontinence i.e. one or more episodes of incontinence daily (risk of urinary frequency).
6. α-Blockers with long-term urinary catheter in situ, i.e. >2 months (drug not indicated).

G. Endocrine System

1. Glibenclamide or chlorpropamide with Type 2 diabetes mellitus (risk of prolonged hypoglycaemia).
2. β-blockers in those with diabetes mellitus and frequent hypoglycaemic episodes i.e. ≥1 episode per month (risk of masking hypoglycaemic symptoms).
3. Oestrogen with a history of breast or venous thromboembolism (increased risk of recurrence).

H. Drugs that adversely affect fallers.

1. Benzodiazepines (sedative, may caused reduced sensorium, impaired balance).
2. Neuroleptic drugs (may cause gait dyspraxia, Parkinsonism).
3. First-generation antihistamines (sedative, may impair sensorium).
4. Vasodilator drugs with persistent postural hypotension i.e. recurrent >20 mmHg drop in systolic blood pressure (risk of syncope, falls).
5. Long-term opiates in those with recurrent falls (risk of drowsiness, postural hypotension, vertigo)

I. Analgesic Drugs

1. Use of long-term powerful opiates e.g. morphine or fentanyl as first-line therapy for mild-moderate pain (WHO analgesic ladder not observed).
2. Regular opiates for >2 weeks in those with chronic constipation without concurrent laxatives (risk of severe constipation).
3. Long-term opiates in those with dementia unless indicated for palliative care or management of moderate-severe chronic pain syndrome (risk of exacerbation of cognitive impairment).

J. Duplicate Drug Classes

1. Any duplicate drug class prescription, e.g. two concurrent opiates, NSAIDs, SSRIs, loop diuretics, ACE inhibitors (optimisation of monotherapy within a single drug class should be observed prior to considering a new class of drug).
APPENDIX 1: START: Screening Tool to Alert doctors to Right i.e. appropriate, indicated but often omitted Treatments.

These medications should be considered for people ≥65 years of age with the following conditions, where no contraindication to prescription exists.

A. Cardiovascular system.
1. Warfarin in the presence of chronic atrial fibrillation (AF)
2. Aspirin in the presence of chronic AF, where warfarin is contraindicated, but not aspirin.
3. Aspirin or clopidogrel with a documented history of atherosclerotic coronary, cerebral or peripheral vascular disease in patients with sinus rhythm.
4. Antihypertensive therapy where systolic blood pressure consistently > 160mmHg.
5. Statin therapy with a documented history of coronary, cerebral or peripheral vascular disease, where the patient’s functional status remains independent for activities of daily living and life expectancy is >5 years.
6. Angiotensin converting enzyme (ACE) inhibitor with chronic heart failure.
7. ACE inhibitor following acute myocardial infarction.
8. β-Blocker with chronic stable angina.

B. Respiratory system.
1. Regular inhaled β₂ agonist or anticholinergic agent for mild to moderate asthma or chronic obstructive pulmonary disease (COPD)
2. Regular inhaled corticosteroid for moderate-severe asthma or COPD, where predicted FEV₁ <50%.
3. Home continuous oxygen with documented chronic type 1 respiratory failure (pO₂<8.0kPa, pCO₂<6.5kPa) or type 2 respiratory failure (pO₂<8.0kPa, pCO₂>6.5kPa)

C. Central nervous system.
1. L-DOPA in idiopathic Parkinson’s disease with definite functional impairment and resultant disability.
2. Antidepressant drug in the presence of moderate-severe depressive symptoms lasting at least 3 months.

D. Gastrointestinal system.
1. Proton pump inhibitor with severe gastro-oesophageal acid reflux disease or peptic stricture requiring dilation.
2. Fibre supplement for chronic, systematic diverticular disease with constipation.

E. Musculoskeletal system.
1. Disease-modifying anti-rheumatic drug (DMARD) with active moderate-severe rheumatoid disease lasting >12 weeks.
2. Bisphosphonates in patients taking maintenance corticosteroid therapy.
3. Calcium and Vitamin D supplement in patients with known osteoporosis (previous fragility fracture, acquired dorsal kyphosis).
F. Endocrine system.

1. Metformin with Type 2 diabetes +/- metabolic syndrome (in the absence of renal impairment*).

2. ACE inhibitor or angiotensin receptor blocker in diabetes with nephropathy, i.e. overt urinalysis proteinuria or microalbuminuria (>30mg per 24h) +/- serum biochemical renal impairment*.

3. Antiplatelet therapy in diabetes mellitus with co-existing major cardiovascular risk factors (hypertension, hypercholesterolaemia, smoking history).

4. Statin therapy in diabetes mellitus if co-existing major cardiovascular risk factors present.

*Serum creatinine >150µmol/L, or estimated GFR <50ml/min
APPENDIX 2: STOPP/START Data Collection Form

Identifier code: 001

SECTION 1: PATIENTS DETAILS

Male □ Female □
Age category (years): 65-69 □ 70-74 □ 75-79 □ 80-84 □ 85-89 □ 90-94 □ 95-99 □ 100-104 □
GP: GP1 □ GP2 □ GP3 □ GP4 □
    GP5 □ GP6 □
Ward: Birr: Camcor □ Sandymount □ Laurel □
       Edenderry: Suite 1 □ Suite 2 □

SECTION 2: PAST MEDICAL HISTORY

SECTION 3: RELEVANT LABORATORY DATA/CLINICAL OBSERVATIONS (Blood pressure/blood glucose levels/weight)
**SECTION 4: CURRENT MEDICATION** (Drug, dose, route, frequency, duration)

**SECTION 5: APPLICATION OF STOPP/START**

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**SECTION 6: NON-STOPP/START PHARMACISTS RECOMMENDATIONS**

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## SECTION 7: PHARMACIST/GP CONSULTATION

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**Comments:**
APPENDIX 3: Standard Operating Procedure for STOPP/START as a clinical pharmacy service in the elderly Community Nursing unit setting.

1. Contact each General Practitioner (GP) providing a medical service to the Community Nursing Units and attain agreement from them to participate in the STOPP/START as a clinical pharmacy service study.

2. Give each GP a designated date and time to meet with the investigating pharmacist to review their patients' medication as part of the STOPP/START study in the Community Nursing Units.

3. Complete the STOPP/START Data Collection form (Appendix 2) as detailed below for each patient participating in the STOPP/START as a clinical pharmacy service study:

How to complete the STOPP/START Data Collection tool

Section 1: Patient details& Identifier code

Information for section 1 is obtained from the following sources: medical notes, nursing care plans, drug kardex. Ensure each patient is allocated their unique identifier code (001, 002…) at this point for data protection and data analysis purposes.
Section 2: Past medical history.

Determine the patient’s past medical history through a comprehensive search of the patient’s medical records, past discharge summaries and clinical letters. All patient records are available at the nurses station on the wards.

Section 3: Relevant laboratory data/Clinical observations (blood pressure/blood glucose readings/weight).

Laboratory data are found filed in the patients medical notes, details of the patients blood pressure, blood glucose readings and weight will be recorded on the observation record at the end of the patient’s bed but may also be filed in the patient’s nursing care plan.

Section 4: Current medication (drug, dose, route, frequency, duration).

The patient’s current medication is recorded from the drug kardex. Record all regular and when required medication.

Section 5: Application of STOPP/START/Pharmacist recommendations.

Apply the STOPP and START drug screening criteria systematically to each patient’s list of regular medication. Document the recommendations and STOPP/START code.

Section 6: Non-STopp/START Pharmacist recommendations.

Apply one’s own clinical knowledge given the patient’s past medical history, laboratory findings, clinical observations and current medication. If
you feel there are any additional pharmaceutical recommendations
document these in this section.

**Section 7: Pharmacist/GP consultation on the patient’s ward.**

During the Pharmacists consultation with the GP each of the
recommendations in section 5 and 6 are discussed. The pharmacist
provides a quick overview of each patient using the data collection form to
summarise details relating to the patient’s past medical history, relevant
laboratory findings, clinical observations and current medication. If
necessary the patient can be examined clinically or the nurse taking care
of the patient consulted. Any changes to the drug regimens are
documented in the Drug Kardex and medical notes. If recommendations
are declined the reasons why is documented on the data collection form.
Place a STOPP/START sticker in each patient’s medical notes. This is
signed and dated by the General Practitioner and Pharmacist once the
medication review is complete.
Any additional prescriptions which are required should be written up at the
end of each review.

4. Once each General Practitioner has completed the STOPP/START
medication review of all their patients in the Community Nursing Unit then
ask them to read the consent letter (Appendix 4) and participate in a post
service evaluation interview.
5. Once consent is attained, conduct the short post service evaluation interview (*Appendix 5*) with each General Practitioner who participated in the STOPP/START as a clinical pharmacy service study.
APPENDIX 4: General Practitioners consent letter to participate in STOPP/START study

Shirley Armitage (Clinical Pharmacist)
Birr Community Nursing
Birr
Co. Offaly

Dear ______________

This letter is to give you information in the hope that you will participate in a interview for a project as part of my Clinical Pharmacy Masters at Robert Gordon University.

This interview will inform my study on the acceptability of STOPP (Screening Tool of Older Persons Prescriptions) and START (Screening Tool to Alert doctors to Right Treatment) as a pharmacy service in an elderly community nursing unit population.

Participation in this study is entirely voluntary. It will involve an interview of approximately 10 minutes in length to take place at (venue to be confirmed) on (date & time to be confirmed) as previously arranged.

You may decide not to answer any of the interview questions if you wish. You may also decide to withdraw from this study at any time by advising Shirley Armitage. I may ask for clarification of some points after the interview, but you will not be obliged in any way to clarify or participate further. Beyond that I will not seek any more interviews or make any further contact with you about this after the interview unless you ask me to.

If you have any questions regarding this study or would like additional information please ask me before, during, or after the interview.

Yours Sincerely,

Shirley Armitage
I have read the information presented in the information letter about a study being conducted by Shirley Armitage for a Clinical pharmacy Masters project at Robert Gordon University.

I have had the opportunity to ask any questions related to this study, and received satisfactory answers to my questions, and any additional details I wanted.

I am also aware that excerpts from the interview may be included in the project write up to come from this research.

I was informed that I may withdraw my consent at any time by advising the researcher. With full knowledge of all the foregoing, I agree to participate in this study.

Participants Name:___________________
Participants Signature:______________
Interviewer Name:___________________
Interviewer Signature:______________
APPENDIX 5: General Practitioner’s (GP) interview schedule to evaluate the acceptability of STOPP and START as a clinical pharmacy service to facilitate three monthly medication reviews in an elderly community nursing unit population.

1. Is STOPP and START acceptable as a clinical pharmacy service?

2. Does STOPP and START as a clinical pharmacy service aid completion three monthly medication reviews?

3. Is it feasibility to introduce STOPP and START as a clinical pharmacy service to facilitate completion of three monthly medication reviews in other community nursing units in the region?

4. Perceived barriers to the introduction of STOPP and START as a clinical pharmacy service in other community nursing units in the region?

5. Have you any recommendations to improve the acceptability of STOPP and START as a clinical pharmacy service to facilitate completion of three monthly medication reviews?
APPENDIX 6: Transcript of qualitative data from General Practitioners Post Clinical Pharmacy Service evaluation interviews.

Question 1: Acceptability of STOPP/START as a clinical pharmacy service

Response 1:

Yes, STOPP/START is acceptable as a pharmacy service in BCNU. It is a useful means to review patients medication by reducing inappropriate antihypertensive or anti diabetic tablets we could help prevent future falls for some patients, similarly initiating calcium or bisphosphonate supplements for patients taking long term steroids may prevent catastrophic fractures.

Response 2:

Highly acceptable. It helps to meet our mandatory obligation to review residents every three months. I found the service to be very well organised, key relevant points of each patients history were clearly documented in the patient profiles. It was useful to see recent blood pressure results, any recent weight changes of note were highlighted. The medication for review/discussion was highlighted and open to discussion. The holistic and patient specific approach was commendable. Residents age, social and environmental factors were taken into account when deciding whether to stop, reduce or start medication. The service is acceptable given the community nursing unit setting as compliance issues are not a factor, any changes made can be monitored for good or adverse effect. The service benefits the patients making them feel better, reducing falls risks. The service also benefits the Health service executive with reduced medical bills and a potential reduction in hospital admissions. The service is useful as it ensures documentation of the review in the medical notes. We see our patients most weeks but it is often fire-fighting/dealing with acute problems rather than review the overall patient. The service is also a good learning tool for GPs on training posts-when reviewing elderly patients many factors must be taken into consideration. Sometimes we are at a disadvantage when making decisions in the nursing home as the availability of blood results is limited. This is the nature of community nursing units, patients shouldn’t be poked and prodded everyday.

Response 3:

This is a very helpful service. Anything which helps us to meet the required standard for healthcare is most welcome.

Response 4:

Wonderful. We haven’t had any clinical pharmacy input in this nursing unit. The service is very well organised and a most welcome to ensure we meet
the required standard of three monthly reviews for all our residents. Looking forward to having the service permanently.

Response 5:

Acceptable. The service is developed to ensure we meet the 3 monthly review as required in the national standards for residential care setting for older people in Ireland. It is well organised and once it is kept simple and not too time consuming it is acceptable.

Question 2: Whether or not STOPP/START as a clinical pharmacy service aids completion of 3 monthly medication reviews at BCNU

Response 1:

Yes, it does aid completion of required 3 monthly reviews. Rather than glancing through the drug chart having the pharmacist there with you focuses your attention and provides and opportunity for discussion and review of individual patient’s medication and care plan.

Response 2:

Yes. The first review will obviously be the hardest but after that it should be a matter of building on previous work and changing the prescription to meet the patients changing requirements. It is helpful as a method of documentation and proof that the review has been conducted. The addition of a clinical pharmacists in the review process gives additional expertise to pick up on any potential drug interactions or changes in current practice.

Question 3: Perceived feasibility of introducing STOPP/START as a clinical pharmacy service in other community nursing units in the region

Response 1:

I think it should be feasible. It shouldn’t make any difference which GP you work with, the patients will benefit ultimately. One to one discussion is preferably, as notes can sometimes lead to a time lag and there can be some confusion about recommendations. GPs and Pharmacists usually can come to a faster commonsense conclusion when working together.

Response 2:

Yes it is feasible within the public nursing homes if the service is developed. However, private nursing homes will have to rely on community pharmacist. It is essential to have access to medical notes and clinical parameters of individual patients to successfully review and monitor treatment regimens.
Question 4: Perceived barriers to the introduction of STOPP/START as a pharmacy service in Birr CNU and other community nursing units in the region.

Response 1:

If GP are defensive and feel the pharmacists is questioning their ability this may be a barrier to introducing the service. I don’t feel that way at all, I am very open to suggestion. I feel the pharmacist is an extra pair of eyes and another healthcare professional giving advice from their perspective. Doctors and pharmacists clinical opinion won’t be a million miles apart. I can’t think of any other barriers.

Response 2:

Chiefly manpower from the pharmacy perspective there is noone else in this role at present. Time may also be a perceived barrier for GPs. I feel the first review will be the most time consuming but after that it should be ok, our pharmacist is flexible and willing to organise the reviews in a timely manner. If it’s only every 3 months it should be fine. Community pharmacists may pay visits to nursing homes but without consulting medical notes and individual patients clinical parameters it is difficult to make recommendations or suggestions to the GP.

Response 3:

Going into an unfamiliar nursing home may pose a barrier initially. If doctors staff feel you are interfering, questioning how they are conducting their business. Some doctors might be defensive but on the whole most doctors welcome an extra pair of eyes from a clinical pharmacist who has reviewed the medical notes and knows what they’re talking about.

Question 5: Recommendations to improve acceptability of STOPP/START as a clinical pharmacy service to facilitate completion of 3 monthly reviews

Response 1:

I think the first review will probably be the hardest but once the time for the review is prearranged and scheduled it shouldn’t be a problem to attend and complete subsequent reviews. The screening tool flags up certain recommendations which may not be practical for certain patients i.e. bisphosphonates in dysphagic patients so the implicit discussion and decision making with the pharmacist is also an essential part of the service. Consulting the nurses for certain patients particularly when considering reducing doses of benzodiazepines is also an important part of the review process.
Response 2:

I found the service very acceptable as it is currently being delivered.

Response 3:

Not really sure. I found the manner in which the review was conducted to be very efficient and acceptable. Everything was prepared in advance and we were able to conduct our nineteen reviews in two hours or so which I feel is very acceptable.