Prescribing for Institutionalised Older People

A thesis submitted to the University of Dublin in fulfillment of the requirements for the degree of Doctor of Philosophy by:

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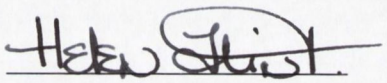
DECLARATION

I hereby declare that this thesis has not been previously submitted for a degree at this or any other university and that it represents my own unaided work, except where duly acknowledged in the text. I agree that this thesis may be lent or copied at the discretion of the librarian, Trinity College, Dublin.



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SUMMARY

Introduction: In order to investigate aspects of prescribing practice and drug administration in institutionalised older people, the following aims for the study were developed:

- To compare prescribing practices between the four selected long-stay institutions for older people;
- To introduce guidelines for the administration of medicines, in tandem with an educational programme for staff;
- To compare prescribing practices following this intervention, with particular reference to those drugs that have been identified as having implications for the quality of life for older people;
- To compare medication costs before and after the intervention;
- To compare prescribing patterns among the elderly residents in long-term care institutions with a similar cohort of older people, matched by gender and age, and resident in the community.

Methods: Four units were selected from all those in the ERHA region of Ireland classified under the heading of "geriatric hospitals and homes" where medical cover was the responsibility of general practitioners. A pilot study was undertaken, including different measures of clinical and non-clinical audit, which identified medicines management as an area for quality improvement.

The data collection process took place in October 2000 (pre-intervention) and again in April 2002 (post-intervention). All residents' prescription charts were copied and additional data was collected relating to site, ward, gender and age. Residents were assessed using the Barthel Index and MMSE. Medication was described by name, method of delivery, dose, times prescribed daily, PRN prescriptions, including maximum dose where stated, and total number of drugs per resident.

The daily ingredient cost per drug was calculated, and the appropriate ATC classification given.

Staffing levels were recorded and nurse/patient ratios calculated. Drug administration rounds were observed and timed.

The community controls were identified from prescribing data from the GMS payments board database in the ERHA: five patients were randomly selected from the database, and matched by gender and age in five-year bands with each long-stay residents and ingredient costs calculated.

A multi-professional Steering Committee drafted guidelines for the administration of medicines, which were extensively circulated and discussed. Expert opinion was sought where appropriate. All nursing staff in all four hospitals attended an In-Service Drug Update Programme and received a copy of the guidelines.

Results: There was a cohort of 560 residents in October 2000 and 557 residents in April 2002. The residents had a median age of 82 years (range of 46-102) in 2000 and 81years (range of 49-101) in 2002. There were a total of 6,139 drug prescriptions in 2000, and 6910 prescriptions in 2002. There were 448 (2000) and 447 (2002) different drugs relating to 371 and 365 different WHO Collaborating Centre for

Drugs Statistics Methodology codes. The majority of residents were prescribed medication, with paracetamol the most commonly prescribed drug: 95.9% of residents were prescribed five or more drugs in 2000 and 96.9% in 2002. In 2000 the residents received a median number of 10 medicines, range from 1-27 (IQR 8, 14): the numbers of prescriptions increased over time with a median number of 12 medicines, range from 1-29 (IQR 9, 15), recorded in 2002.

There was a statistically significant increase in the total median cost for residents, which was €9.78 in 2000, and €11.85 in 2002 ($p=<0.0001$) in part attributable to the introduction of new and more expensive drugs. The range of costs in 2000 was €0.23-73.14, and in 2002 was €0.12-189.24 ($p<0.0001$). There was a difference between sites for cost per resident over time, and also a difference in staffing levels between sites.

Conclusion: The older residents in the four long-stay institutions under study are receiving more drugs both than their counterparts in the community, and older residents in similar extended care facilities. Although the overall prescribing has not been reduced in quantity following the interventions, practice changed and developed over time, with marked differences between sites in the patterns of medication prescribed.

ABBREVIATIONS

ABA	An Bord Altranais
ADR	Adverse Drug Reaction
ATC	Anatomical Therapeutic Chemical classification
BGS	British Geriatric Society
BMJ	British Medical Journal
BNF	British National Formulary
CDHA	Cheltenham and District Health Authority
DoH	Department of Health
DoHC	Department of Health and Children
EHB	Eastern Health Board
ERHA	Eastern Regional Health Authority
HAS	Health Advisory Service 2000
et al.	…and others
EU	European Union
HeSSOP	Health and Social Services for Older People
IQR	Inter-quartile range i.e. the range from the 25th to the 75th percentile. which encompasses the median percentile, and is sometimes used as a measure of dispersion for non-parametric data
MIMS	Monthly Index of Medical Specialties
MMSE	Mini-Mental State Examination
NCAOP	National Council on Ageing and Older People
NCE	National Council for the Elderly
NDU	Nursing Development Unit
NMIC	National Medicines Information Centre
NSAIDs	Non-steroidal anti-inflammatory drugs
OTC	Over the counter medicines
PRN	*pro re nata*/as required
RCP	Royal College of Physicians
TENS	Transcutaneous Electric Nerve Stimulation
WHO	World Health Organisation

Contents

Appendix 3: A case-control study comparing drug prescribing in older people in long-stay care with those residents in the community

INDEX of TABLES

INDEX of FIGURES

CHAPTER ONE:

INTRODUCTION

1.1 The Older Person and Health Care

Population projections in the western world assume that the number of older people will continue to grow, while the population of younger adults and children is becoming smaller (Leahy and Wiley, 1998). This 'demographic time bomb' has given rise to speculation that this trend towards population ageing will have serious implications for the future configuration of health services according to the Annual Report of the Chief Medical Officer (Department of Health and Children 2000).

Figures published by the Central Statistics Office in 2001 (Central Statistics Office, 2001) estimated that there were 429,100 people over the age of 65 years living in the Republic of Ireland. This represents 11.2% of the total population. All recent demographic projections indicate that while the overall population numbers will remain stable, the number of older people within that profile will grow significantly. The National Council on Ageing and Older People has published projections (Fahey 1996) which estimate that by the year 2011 the population aged 65 years and over will represent some 14.1% of the general population.

However, the situation in Ireland has some unique trends in respect of older people and their health care needs (Fahey 1997). Firstly, population ageing has not hitherto been the key feature of the Irish population, which, historically, has been shaped by juvenation. This means that when an ageing population does arrive it will not have the same

economic impact as elsewhere i.e., that there will not be sufficient numbers in the workforce to support the older dependent group.

Further, the Irish health service has not developed differently in size or structure to other countries, despite the different population profile (Fahey 1998). Health expenditure is therefore not consistently related to the ageing population.

Furthermore, there are unique features including immigration, regional differences and numbers of unmarried people, which will affect the delivery of health services.

1.1.1 Mortality

Prior to the 1980's there was little change in old age mortality. There had been little improvement in men's life expectancy since the turn of the century, while women's life expectancy had gradually increased from the 1940's. From the 1980's there were several jumps in life expectancy for both men and women, although, because of the poor starting point, this still left Ireland at the bottom end of rankings according to Information Management Unit Health Statistics (Department of Health and Children (DoHC) 1999). Life expectancy in Ireland remains the lowest in the European Union (EU) as reported by the Health Promotion Strategy (Department of Health and Children 2000b). From this it has been inferred that people in Ireland reach the age of 65 with poorer health than elsewhere in the EU, and that the older population has higher levels of morbidity than

elsewhere. While Irish life expectancy has improved, so has the rest of Europe, and there is no indication that Ireland is narrowing the gap.

1.1.2 Migration

Migration has been one of the key features that have shaped the demographic profile of Ireland. Although overall migration figures have fluctuated during the 20th century, migration patterns in the older population have been relatively stable. For the over 65's as a whole there has been net migration into Ireland. Due to the under-registration of deaths in this age group it is believed that there may have been an under estimation of immigration of older people into Ireland in the past. Studies of death registrations in the west of Ireland in the 1960s and 1970s indicated a high incidence of non-registration of deaths, especially among the very old (Dean and Mulvihill, 1972, Dean and McLoughlin 1980). In the National Council for the Elderly (NCAOP) publication Health and Social Care Implications of Population Ageing in Ireland, Fahey suggests that the inconsistent figures in the past were a statistical artefact, and that while absolute figures of net migrants among older people have remained relatively stable, their relative size as part of the population of older people has declined. (NCAOP, 1996) Figures in the year 2000 estimated the net in-migration of older people at approximately 2000, only a slight increase from 1995 (NCAOP) 2001).

1.1.3 Age profiles

It has been estimated that 11.8% of the population will be elderly by the year 2006, (NCAOP 1998) rising to 17% by 2026. However, in the Department of Health current statistics on long-stay care, they estimate that 11.8% of the population were already over the age of 65 years in 2002, and that the figure would rise to18% by 2031. (DoHC 2002) An important aspect is the changing profile within the older population. The greatest absolute increase is among the younger elderly at 60%. Population ageing is reflected not only in the growth of the population aged 65 and over but also in 'secondary ageing', that is, the predicted growth or the numbers of the old elderly (those aged 80 and over) compared to the young elderly (Fahey 1996). However, the increase in those 85 years and over is 120%. The elderly share of the total population is influenced by declines in fertility rates. There is no increase in old dependency, with Ireland having the lowest old dependency in Europe.

1.1.4 The Irish Family

One of the key reasons that older people do have a significant impact on patterns of health care is that of marriage avoidance. From the 1850's to the 1960's between a quarter and a third of Irish men and women never married. This was particularly associated with living in rural areas (Fahey 1996). Thus this group of people do not have either spouses or children to take care of them when their health fails. In tandem with the lower rates of fertility and a move away from the extended family towards a nuclear

family, this leaves older people dependent on professional assistance, where family and other networks would once have provided it.

1.1.5 The well elderly

The majority of the older population live at home (Fahey 1996). Although, as has been stated many are unmarried, older people benefit from a high rate of survival of kin, especially lateral kin e.g. brothers, sisters, and cousins. In 1996 there were 106,943 older people living alone, accounting for 25.9% of people over the age of 65 years (Fahey 1996). This is quite low as in other European countries the figure is closer to 40% (DoHC 1999). The percentage of older people living alone has been projected to grow from 24 per cent in 1991 to 26 per cent in 2011 (Fahey, 1996). The rate of living alone in most European countries is increasing steadily, while the rate in Ireland is slower, largely due to the changes in marital status of older people. It is anticipated that the largest increase in the elderly population will be in women over the age of 80 and mostly widowed (NCAOP 1998). The increased rate of widowhood, with the likelihood that these older women may live alone, is expected to be fully counterbalanced by the increase in the numbers of couples and the decrease in the number of single persons (Fahey, 1996). Those elderly who have married have relatively large families, although this is somewhat counterbalanced not only by emigration from the country but from rural to urban areas.

1.1.6 The health status of the older person

A study of older people living in the community by the Health and Social Services for Older People (HeSSOP) in 2001 found that older people's health was generally good (Garavan *et al.* 2001). The study also showed low levels of functional disability, with 77% reporting self-sufficiency in carrying the activities of daily living.

Information on the incidence and prevalence of different illnesses in older people are not yet available in Ireland. The 2001 survey does not offer a complete picture of the health of older people: it excludes people in either acute hospital or long-stay care, added to the probability that participants would be healthier than non-participants. However, the study did try to gain some baseline information about health status, by asking respondents about their health problems during the previous 12 months. It also sought information about chronic illness and a proxy was used where appropriate to elicit information.

The survey results show 14% of the older people included in the survey as free from any underlying illness or chronic problems in the previous year. The most commonly reported problems were bone or joint conditions (46%), hypertension (36%), eye or vision problems (22%), cardiac conditions (20%), memory or concentration (17%), hearing problems (17%) and sleep problems (17%) 80% of medical cardholders and 70 % of non-card holders reported using medicines. 72% had used their general practitioner in the last 12 months, with an average number of 5.3 visits. When asked about their future needs, 87% stated that remaining in their own home was the most acceptable long-term option.

1.1.7 The dependent elderly

The 1994 strategy document *Shaping a Healthier Future* (DoHC 1994) gave a target of maintaining 95% of people over the age of 75 years in their own home. However, when older people become very frail, suffer a catastrophic medical event such as a cerebral vascular accident or major fracture, or lose their primary carer, it may become impossible for them to live safely at home. This still means that there will be a need to provide long-stay residential care services for older people. There are approximately 5% of older people in long-stay units of different categories.

1.1.8 Long-stay residential care

Since the publication of the strategy document *The Years Ahead* in 1988, (Department of Health (DoH) 1988) the configuration of long-stay services has changed. Long-stay facilities in Ireland cover a range of options: health board geriatric homes/hospitals, welfare homes, health board community hospitals, voluntary homes/hospitals, private nursing homes and psychiatric hospitals. The number of beds in private nursing homes has increased to approximately 14,000 beds (55%), which has led to a decrease in the number of beds in both geriatric homes/hospitals and psychiatric hospitals (NCAOP 2001). In 2000, the Department of Health and Children estimated the number of beds in extended care at 9,699 (Department of Social and Family Affairs (DSFA) 2002).

Over one quarter of long-stay patients (29.5%) were resident in a long-stay unit in the Easter Regional Health Authority area at 31st December 2002 (DoHC 2002). This compares to the North-Western health Board which recorded the lowest proportion of patients at 7.4%.

Access to a bed in a nursing home is determined and regulated by the Nursing Homes (Care and Welfare) Regulations 1993 (Minister for Health 1993). A limited number of the places in these privately run homes are subsidised by the health boards (known as 'subventions'), and allocated according to the individuals' income, assets and ability to carry out their activities of daily living (ADLs). Nursing homes register with the health board and are regularly inspected. However, people who have poor levels of physical function, challenging behaviour or other special needs may not deemed suitable to be supported in a nursing home. Other factors include availability of places and geographical considerations. Placement in a long-stay hospital or home in the public sector would then be considered. It has been suggested that the attitude of nursing staff in general medical wards has an influence on the older person being offered continuing hospital care rather than community care (Carter, and MacInnes 1996).

It should be borne in mind that many older people reside temporarily in acute hospitals, usually receiving short-term care but often awaiting transfer to a more suitable long-stay setting. It was estimated that 4,590 older people (1.19%) resided in acute hospitals at any one time in 1996 (DoHC, 1998). The largest proportion of older people resident in long-term care at December 31st 2002 in the maximum dependency category (DoHC 2002),

which means they require a high degree of nursing care and assistance. Levels of dependency vary across the different long-stay unit categories, with health board geriatric homes and hospitals having the largest proportion (78%) of residents in the high or maximum dependency categories.

1.1.9 Health Board Geriatric Homes and Hospitals

Historically, long-stay services for older people in the public sector were developed in institutions originally built as workhouses and county homes (often located in rural areas and run by the religious orders), isolation hospitals or military establishments. These older homes and hospitals are large in comparison with modern units, with an average of 130 long-stay beds (Blackwell *et al.* 1992). As the patient focus changed and residents became more elderly and more physically and psychologically dependent, so the need for medical, nursing and paramedical interventions increased. A 1992 survey indicated that as many as 73.4% of residents were rated as having high or maximum dependency levels (Blackwell *et al.* 1992). Some of these older units remain heavily influenced by both limited resources and tradition, based on services for a different group of residents, which often led to further dependence on ritual and routine (Wright 1994). The number of beds was estimated at 5,925 in 1996. It is estimated that 76.1% of residents were discharged or died within three months of admission, 12.1% were resident for more than one year and 2.5% resident for more than six years.

Since the publication of *The Years Ahead* (DoH 1988), Ireland has begun implementing a policy of building new, smaller units with a maximum 50 beds specifically designed for the elderly and located within easy access of the local community. These units have a clear philosophy of care, based on an individualised approach and using a multidisciplinary model. However, increased demand for places means that places remain limited.

1.1.10 Medical and social status of long-stay care residents

A 1992 survey showed that there were major differences in the medical and social status of long-stay residents across different health board regions in the country (Blackwell *et al.* 1992). The most common reason for residence in long-stay care being a chronic physical illness (35%), and some form of psychological disorder (Table 1.1).

Table 1.1 Primary medical/social status of older people in long-stay care 1992

Category Of Unit	Health Board Geriatric Home or Hospital	Health Board Welfare Home	Community Hospital	Voluntary Geriatric Home or Hospital	Private Nursing Home
Chronic mental illness	6.9	9.1	4.9	4.3	5.1
Chronic physical illness	45.8	33.5	41.6	28.2	25.2
Convalescence/ rehabilitation	3.5	1.3	9.2	3.0	3.4
Mental infirmity/ dementia	16.8	6.3	13.1	18.0	23.8
Physical disability	10.7	12.0	12.1	20.5	18.0
Mental handicap	2.6	2.0	1.7	1.5	1.2
Social reasons	11.5	34.5	10.8	15.2	18.4
Terminal illness	1.2	0.8	3.9	4.7	1.4
Other	1.1	0.4	2.7	4.6	2.8
Not specified	0	0	0	0	0.8
Total	*100*	*100*	*100*	*100*	*100*

Source: Department of Health Survey of Long-Stay Units 1992 (Blackwell)

Table 1.2 gives details of the number and types of beds, number of residents and the occupancy rates of the long-stay units by category (DoHC 2002).

Table 1.2 Long-stay units by category: Number of beds available, number of patients and % beds occupied at 31st December 2002

Category of unit	Beds	Respite Beds	Total Beds	% of Beds	Patients	% of Patients	% Occupancy
Health Board Geriatric Home/Hospital	5169	302	5471	23.7	5092	24.3	93.1
Health Board Welfare Homes	863	26	889	3.9	846	4.0	95.2
Health Board District/Community Hospitals	2693	232	2871	12.5	2612	12.5	91.0
Voluntary Geriatric Homes/Hospitals	3227	156	3383	14.7	3115	14.9	92.1
Private Nursing Homes	10,301	144	10,445	45.3	9294	44.3	89.0
TOTAL	***22,199***	***860***	***23,059***	***100***	***20,959***	***100***	***90.9***

It can be seen that between 1992 and 2002, although the number of beds in Geriatric Homes/Hospitals has decreased from 5.925 to 5,169, nearly a quarter of people living in long-stay care are still resident in these units.

The 2002 survey (DoHC 2002) found that most residents in long-stay care were categorised as either having mental infirmity or dementia (22.9%) or chronic physical illness (32.7%): together these accounted for 50% of residents. In Health Board Geriatric

Homes and Hospitals residents were categorised as having chronic physical illness (40.1%), mental infirmity or dementia (20.1%) and chronic mental illness (7.2%). 15.6% of residents were discharged on their death.

When the Medico/Social Status of residents within all the health board were sub-categorised according to the four groups, namely physical disorders, mental disorders, social reasons and "other", 50.4% fell into the physical disorder category, 31.5% into the mental disorder, 12.8% social reasons and 5.3% other.

Table 1.3 Percentage distribution of patients resident at 31st December 2002 by Medico/Social status in ERHA

Medico/Social Status	**%**
Chronic Mental Illness	7.0
Chronic Physical Illness	26.1
Convalescence /Rehabilitation	2.5
Mental Infirmity/Dementia	27.1
Physical disability	13.4
Mental Handicap	0.9
Social Reasons	10.8
Terminal Illness	1.3
Other	11.0
Total	*100.0*

The 2002 survey (DoHC 2002) reported that the largest proportion of residents are in the maximum dependency category, which means that they require a high degree of nursing care and assistance. Levels of dependency vary across long-stay unit category, with health board geriatric homes or hospitals having the largest proportion (78%) in the high

or maximum dependency category, and health board welfare homes having the lowest proportion (48.1%) in these two categories.

1.1.11 Older people and mental health

While most older people have good mental health, a significant number can also suffer from a psychological disorder at any one time (Keogh and Roche 1996). Most of these will remain at home, but some may need support at home or admission to an acute psychiatric facility.

Some people require more long-term solutions to their problems: this includes people with dementia about 5% of the over 65's, many of who will require placement in long-stay care (Moriarty 2001). A further 15-20% suffer from other conditions that will require treatment such as anxiety and depression. Compared to a figure of 13.1% in the community, the level of depression among older people in institutions is generally felt to be higher at 39% (O'Neill 1991).

Dementias are predominately disorders of old age with incidence and prevalence rising with age. Most dementias have a gradual onset and become progressively worse over time. There are just over 31,000 people in Ireland with dementia. (58% are women, 42% are men). Just over 22,000 people who have been diagnosed with dementia live in the community, just over 7000 in long-stay care and just over 500 in psychiatric hospitals. It is not known how many are in acute beds. It is anticipated that in future services for older

people with dementia will be delivered by specialist carers in specific settings (O'Shea and O'Reilly 1999). This is an important policy development, as people with dementia often cannot articulate their needs, including symptoms or adverse drug reactions, and so may be at risk from under treatment. Meanwhile, the rate of dementia in long-stay units (non-psychiatric) is high with an estimated 58% of residents with a cognitive impairment.

Although the rate of abstinence increases with age, alcohol abuse remains a problem in later life. The problem of drug abuse in older people is usually associated with prescription drugs that may be perceived as legitimate (Layte *et al.* 1999).

1.1.12 The role of the nurse in geriatric homes and hospitals

Geriatric homes/hospitals in Ireland have registered general nurses on duty at all times of day and night. Registered nurse are governed by the statutory body An Bord Altranais and have a code of professional conduct. (An Bord Altranais (ABA) 1988).

Registered nurses are supported in extended care facilities for older people by care attendants, who have not undergone formal training, but are able to take responsibility for any basic duties allocated to them. Care attendants do not participate in nursing handovers, undertake any technical care such as dressings, observations or drug administration rounds, or any administration such as ordering supplies or writing reports.

Staffing arrangements are organised to have the more staff allocated to the morning shift, less working in the afternoon and evening and a skeleton staff at night. It can be seen that the pattern of the residents' day is shaped by the staffing system, with the bulk of

activities scheduled for the morning so that the workload matches the staffing levels (Wright 1994).

The registered nurse works as an autonomous professional for most of the time, as a general practitioner supervises the medical care.

The Registered Nurse is responsible for assessing the residents in their activities of daily living (Salvage and Kershaw 1990), planning and implementing each person's care and evaluating the efficacy of interventions.

1.1.13 The role of the nurse in the administration of medicines

To date, nursing staff are responsible for all aspects of medication management except for prescribing. Their key role in the administration of medicines was defined by An Bord Altranais in *the Guidance to Nurses and Midwives on the Administration of Medical Preparation 2000* (ABA 2000) and subsequently revised in 2003 (ABA 2003). This includes the following general principles:

- Employers shall have written policies and procedures for nurse on the administration of medical preparations. These policies and procedures should have regard to the different competences of nurses and the various settings in which they practice. Nurse management should be involved in the formulation of such policies and procedures for the administration of medical preparations by nurses.

- Nurses who give medical preparations are responsible for their safe preparation. They should be alert to the nature of medical preparations and should ensure that there is no accumulation of such preparations.
- Nurses should be certain of the identity of the patient to whom the medical preparation is to be administered.
- Nurses should assist in assessing the safety and efficacy of prescribed medical preparations, in the observation of possible side-effects, in the monitoring of interactions and in informing the patient's practitioner, with a view to informing the Irish Medicines Board when necessary.
- Nurses should take appropriate steps to develop their competence and knowledge and seek assistance where required.

It can be seen that the expectations are that nurses play an active role in medicines management, and are accountable for more than ensuring that the right person receives the right medicine at the right time. The report of the *Commission on Nursing* in 1998 (DoHC 1997, 1998) proposed the major expansion of the nurses' role in Ireland. The Commission identified a clinical career pathway including an Advanced Nurse who would exercise higher levels of judgement, discretion and decision-making. This person would have specialist knowledge at Masters level in the clinical speciality in which they practice, and would initiate treatments according to agreed protocols and within agreed parameters. This would include prescribing medication from limited formularies. There is some evidence that nurse practitioners in the United Kingdom can provide equivalent

care to medical staff, and could be more cost effective (Horrocks *et al.* 2002, Venning *et al.* 2000).

1.2 Introduction to Prescribing and Older People

"Old people, especially the very old, require special care and consideration from prescribers"

British National Formulary 2003 (BNF)

1.2.1 Databases

In reviewing the literature, the following computerised bibliographic databases were accessed: Medline, Cinahl, (Cumulative Index to Nursing and Allied Health Literature), BNI (British Nursing Index), Psych Info, EBMR (Evidence Based Medicine including the Cochrane Library database), AMED (Allied and Complementary Medicine), Health Star, HMIC (Health Management), MD Consult, and Economic and Social Data Service.

Heft and Mariotti (2002) described the field of geriatric pharmacology as having developed out of changes in demography resulting in the "graying of the population" that have been accompanied by an increasing knowledge of and sensitivity to the special physiologic, pharmacologic, pathologic, psychological, economic and emotional concerns of older adults. There is an increased incidence and prevalence of systemic disease, especially chronic disease, among older people, which leads to a concomitant rise in the amount of medication they are prescribed (Heft and Mariotti 2002, Steinbrook 2002).

A summary of how age in all its complexity influences the response of older people to drugs and related compounds was provided by Crome (2003). These include physiological changes, changes in pharmacokinetics and pharmacodynamics, cohort effects, diseases in later life, appropriate prescribing, adverse drug reactions and older people and clinical trials. He suggested that

"...some might consider that in people nearing the end of their life, major disability is a worse outcome than death, even if the latter is prevented."

Crome emphasised that while the majority of older people are little different than those in middle age, the frail or hospitalised older person is more likely to have altered pharmacokinetics, leaving this group vulnerable to poor prescribing practices. A report of a working party of the Royal Pharmaceutical Society (RPS 1997) acknowledged that prescribing is a technically difficult and morally complex problem.

The National Service Framework (2001b) stated that older people should:

"... gain the benefit from their medication to increase the quality or duration of their life and not to suffer unnecessarily from illness caused by the excessive, inappropriate or inadequate consumption of medicines."

An addendum to the National Service Framework describes how the use of medicine for and by older people can be improved (DoH, 2001b). Sensible patterns of prescribing are especially important when prescribing for older people, where excessive prescribing is often the norm. (Heath 2003).

Older people receive more prescriptions per head than any other group, and studies in Ireland (Fahy and Murray 1994, Garavan *et al.* 2000) have suggested that as many as 58% to 75% in the community are on medication.

Since 2001, all people older than 70 years in Ireland are eligible for free medication under the General Medical Services (GMS). This includes medicines that are available for purchase over the counter (OTC). The National Medicines Information Centre (NMIC) (NMIC, 2000) found that older people received up to 47% of all prescriptions in the GMS, and it is estimated that as many as 32 items annually are prescribed per older person.

1.2.2 Evidence-based practice in medicines management

The NMIC bulletin *Introduction to clinical research and clinical appraisal* (2003) stated that although evidence-based medicine in clinical practice is seen as one of the key element in future developments in the health service in Ireland, many physicians may have difficulty in understanding the design of clinical studies and interpreting their results.

In their review of prescription monitoring for elderly patients, Oborne, Batty and Jackson (1997) stated:

"Evidence-based prescribing seeks to match drug treatments to patients with proven indications for those treatments. It encompasses both the avoidance of treatments with no proven benefit, no indication or with a contraindication, and the initiation of treatments where proven indicators do exist. This has led to the concept of appropriateness of prescribing."

In his paper regarding issues of medication, Earl-Slater (1998) identified and explored issues relating to medication, the elderly and the problems in securing and using evidence from randomised controlled trials from which the older person is usually excluded. He argued that if no significant improvement comes through on the evidence base, we will never know if we are providing older people with the cost-effective care and attention that they deserve. Wynne (2003) also acknowledged that older people are often excluded from clinical trials, and suggest 'real life' trials with clinically relevant end-points to improve the evidence base in older people are required.

In their review of ageing biology and geriatric clinical pharmacology McClean and Le Couteur (2004) reported that the evidence base for prescribing to older people is small and clearly disproportionate to the amount of prescribing in this group with only 3.45% of 8945 randomised controlled trials and 1.2% of 706 meta-analyses were for people over 65 years old. They recommended that more elderly people should be recruited to randomised controlled trials as one means of increasing the evidence base, or seek alternative mechanisms for determining risk-benefit ratios. They concluded that the current understanding of geriatric pharmacology would not seem to justify the widespread use of medication in frail older people.

The need for an integrated research agenda to improve medication use for older adults was identified by Murray and Callahan (2004). They reviewed four domains of pharmaceutical research, namely drug discovery and delivery, drug efficacy and safety, pharmacoepidemiology and drug policy, and improved access to and use of drugs. They concluded that many major improvements in medication use would also depend on closing the gap between knowledge and practice.

The difficulty in assessing the evidence base for prescribing in older people in residential care in Los Angeles County due to missing diagnosis was identified by Williams *et al.* (1999). Researchers in other studies also discovered missing diagnosis in more than 50% of cases in residential homes for the elderly (Weedle, Poston and Parish, 1988, Weedle, Poston and Parish, 1990).

'Rational' or 'obligatory' polypharmacy is becoming a legitimate practice as increasing numbers of individuals live longer and the range of available practice as increasing numbers of individuals live longer and the range of therapeutic option for many medical conditions increases (Routledge, O'Mahony and Woodhouse (2003). They emphasised that undergraduate and postgraduate education in evidence-based therapeutics is vitally important.

Digueseppi (1996) argued specifically in favour of the evidence base that exists for giving influenza vaccine to everybody over the age of 65 years. Although agreeing with this in principle, King and Morgan (1997) responded that some issues are more complicated than the evidence suggests, and that vaccination raises an example of ethical issues affecting prescribing. They argued that it may be inappropriate, for example, to vaccinate a severely demented bed bound elderly patient whose quality of life is extremely poor. They further pointed out that the issue of quality of life can be only discussed with a competent patient when consent for vaccination is being obtained. They suggested that these situations also require the doctor to have sensitivity and good communication skills in addition to evidence to support their clinical decisions.

The 2001 National Sentinal Clinical Audit *Evidence-Based Prescribing for Older People* (RCP 2001) described clinical indicators of appropriate prescribing, which require objective, explicit information readily obtained either from patients' current prescribing records, or, for specific indicators, from the clinical notes. The report cautioned that these are not a finite measure of quality, bit act as triggers for the clinical team to investigate, evaluate and justify prescribing practices.

1.2.3 Use of medications and polypharmacy

The definitions of polypharmacy are numerous and the criteria vary from study to study. Linjakumpu *et al.* (2002) reported that no specific number of medications has been

established with which to define polypharmacy. They differentiated between polypharmacy as a simple count of medications, or the administration of more medications than is clinically indicated. They selected the concomitant use of more than five medicines in their two large cross-sectional surveys in Finland.

In their study of major polypharmacy in general practice in Denmark, using the concurrent use of five or more drugs as their definition, Bjerrum *et al.* (1999) found a six-fold variation in the prevalence of major polypharmacy between 173 general practices. Busy working doctors were more inclined to prescribe multiple drug prescriptions than doctors with more time and less pressure. Bjerrum *et al.* (1998) also examined polypharmacy in the general population in Denmark, and found that the prevalence increased with age; from the age of seventy two thirds of all drugs users were polypharmacy users. Drug use was 50% more prevalent among women than men, but over the age of seventy there was no difference between men and women in the prevalence of polypharmacy.

Masoudi and Crumholtz (2003) discussed polypharmacy and the increasingly complex care of patients, mostly elderly, diagnosed with heart failure. For some treatment includes agents that prolong life, alleviate symptoms and reduce admissions to hospital. The treatment of underlying symptoms including hypertension, coronary artery disease and dyslipidaemia increases the number of pharmacological agents that are considered necessary for many patients with heart failure. The authors concluded that

polypharmacotherapy is inevitable in people with heart failure and multiple comorbidities. It has been suggested elsewhere that polypharmacy is common in older people because in general they experience more chronic disorders and their health problems are multiple (Heath and Schofield 1999).

In his assessment of the risks of polypharmacy, Shepherd (1998) suggested that social and cultural pressures may encourage therapeutic interventions at the expense of alternative actions such as changes in lifestyle, citing the example of administering laxatives rather than suggesting adjustments to the patient's diet.

Despite the knowledge that several classes of drugs are associated with a higher risk of falls (Tinetti 2003), Lawlor, Patel and Ebraihim (2003), in their cross sectional survey, using data from the British women's heart and health study, found that chronic diseases and multiple pathology were more important predictors of falling than polypharmacy. However, two classes of drugs, namely hypnotics and anxiolytics, and antidepressants, were independently associated with increased odds of falling.

In their systematic review of the role of the pharmacist, Rollason and Voight (2003) found that the vast majority of studies they reviewed failed to demonstrate the real impact of reducing the number of medications of frail older people, and suggest that interventional studies should be designed to measure the clinical consequences of simplifying drug regimens.

1.2.4 Drug interactions

As polypharmacy increases with age so does the potential for drug interactions, which have been shown to cause a decline in functional abilities in older people (Delafuente 2003). The frequency of drug interactions in older people is proportionate to the age and frailty of the patient, the number of medications taken and the number of physicians involved in the care of that person (NMIC 2000). Therefore, when a patient presents with a new symptom, the possibility of interacting medicines should be considered, otherwise there is a risk of beginning the so-called "prescribing cascade" (Rochon and Gurwitz 1997).

1.2.5 Prescribing cascade

Rochon and Gurwitz (1997) suggested that when assessing a patient who is already taking drugs, a doctor should always consider the development of any new signs and symptoms as a possible consequence of the patient's drug treatment. They describe an under-recognised and largely preventable drug related problem that they termed the 'prescribing cascade." The prescribing cascade begins when an adverse drug reaction is misinterpreted as a new medical condition. A drug is prescribed and an adverse drug effect occurs that is mistakenly diagnosed as a new medical condition. A further drug is prescribed and the patient is placed at risk of developing additional adverse effects relating to this potentially unnecessary treatment. The authors suggested that drawing

prescribers' attention to this disturbing sequence of events may be an important step in minimising the occurrence of preventable adverse drug events associated with suboptimal prescribing decisions.

1.2.6 Adverse Drug Reactions (ADRs)

Pierugo *et al. (*1991) defined adverse drug reaction as:

"any noxious, unintended, and undesired effect of a drug used in humans for prophylaxis, diagnosis, or therapy."

This definition excluded therapeutic failures, intentional and accidental poisoning and drug abuse. Their large study of older hospitalised patients (n=9,148) observed a sharp increase of the incidence of ADRs with increasing numbers of drug prescriptions. They suggested that the decline in ADRs in older age was more evident for mild ADRs: as mild ADRs are more likely to be symptoms rather than signs, it may not be easy to detect these in the very old, because they may not report symptoms such as headache, nausea or abdominal pain. Conversely, severe ADRs, which are more often represented by objective signs, can be easily detected even in patients who are not able to refer symptoms.

Beard (2003) suggested that there are complex reasons for the increased frequency of ADRs in elderly people, including poor prescribing, polypharmacy, altered drug handling and response and poor compliance. However, in their review of the published literature

on ADRs, Azad *et al.* (2002) found that it was fraught with problems, including missing prospective data, poorly described reactions and questionable analytical methods.

In their study of elderly patients admitted to a general ward in Rotterdam, Mannesse *et al.* (1997) reported 1 in 6 older people experienced ADRs, with severe reactions in 24% of these patients. Their study confirmed the view that drug reactions are related to the use of more drugs rather than the presence of more diagnoses. Other significant factors in severe reactions were a fall before admission and the presence of gastrointestinal bleeding or haematuria. Mild drug reactions were recognised by these older patients but not severe ones. Leung-Wing, Chu and Pei (1999) also identified adverse drug reaction as a risk factor for early emergency hospital readmission in elderly medical patients in Hong Kong. ADRs were also found to be an important cause of older people presenting to an emergency department in Quebec (Hohl *et al.* 2001).

In contrast, Veehof *et al.* (1999) did not find any increase of ADRs with the number of drugs used in their survey of 2185 older patients in general practice in the Netherlands, but concluded that their study was limited to registered effects. In a large, multi-centred survey of the incidence and risk factors of ADRs in hospitalised medical patients, Carbonin *et al.* (1991) found that age was not an independent risk factor.

Becker *et al.* (1972) in their review of the appropriateness of prescribing, had suggested that the more appropriate the prescribing practice, the less likely that the prescriber felt

there was a significant problem with ADRs. They suggested that if their assumption was valid, then the less appropriate prescribers were seeing more ADRs.

In their population-based review of medical records carried out in Texas, Thomas and Brennan (2000) found that preventable adverse events were more common among elderly patients, probably because of the clinical complexity of their care rather than age based discrimination: preventable adverse drug events were especially common.

Ray (2003) suggested that despite their increasing sophistication, pre-marketing studies do not answer many questions about a drug's effects: randomised controlled trials generally lack the power to detect infrequent adverse side effects, those with a long latency or those that affect only certain types of patients. Since the elderly are usually excluded from these studies, this further compromises their usefulness in monitoring adverse reactions. He pointed out that most ADRs are detected through case reports, which have are limited unless the reaction is distinctive, and has occurred within a close time frame of the person receiving medication. Wayne therefore recommended controlled epidemiological studies as the most reliable observational method for detecting and quantifying the frequency of adverse drug effects.

In a review of adverse drug reactions in elderly patients, Routledge, O'Mahoney and Woodhouse (2003) suggest that in order to recognise and treat ADRs, undergraduate and postgraduate education in evidence-based therapeutics is vitally important. In their report

on the increase in level of reporting of adverse drug reactions since nurses joined the yellow card scheme in the United Kingdom, Hunt and Gjoka (2003) suggested that since nurses comprise the largest group of health care professionals, they are a key source of information. They suggested that this is due to nurses having the closest and most continuous contact with patients and the most involvement in the observation of the effects of medicines. Hall *et al.* (1995) reviewed the spontaneous reporting of ADRs by hospital nurses, and found they reported many life threatening (17%) or moderately severe (76%) reactions. The authors reported that the nurses identified the deficiency of in-service training on drug therapy as one major factor that inhibited their participation.

1.2.7 Problem drugs in the elderly

It is widely recognised that there are certain drugs that cause special problems for older people (Liu and Christensen 2002, McLeod *et al.* 1997). Some of these are given in Table 1.4 below.

Table 1.4 Examples of problem drugs in the elderly

Drugs with a narrow therapeutic index
digoxin
lithium
theophylline
warfarin
Drugs with a long half-life
glibenclamide
nitrazepam, diazepam
fluoxetine
Drugs which predispose to falls
psychotropics
benzodiazepines
antihypertensives e.g. alpha-blockers
Drugs which predispose to bleeding
NSAIDs
warfarin
Drugs which cause hypothermia
phenothiazines
TCAs
Drugs which cause Parkinsonian effects
metoclopramide
psychotropics
Drugs which cause confusion/memory impairment
psychotropics e.g. thioridizane
benzodiazepines
anticholinergics
co-proxamol
cimetidine

National Medicines Information Centre (NMIC 2000)

Two basic mechanisms have been developed to explain age-related differences in drug effects, which lead to a need for special considerations when prescribing for older people. The pharmacodynamics mechanism suggests that changes in drug responsiveness account for such differences (Heft and Mariotti 2002). These change presumably involve either an alteration in the number or activity of receptors on the target cell, or a change in intracellular responses to receptors. There is some documentation supporting this mechanism, but involving only a few classes of drugs.

The more widely accepted pharmacokinetic mechanism (NMIC 2000) suggest that age differences in drug responses are related to changes in drug disposition as a result of alteration in drug absorption, distribution, metabolism or excretion or combination of these processes.

1.2.8 Potential benefits of drug therapy for older people

The clinical guidelines published by the Royal College of Physicians in the document *Enhancing the Health of Older People in Long-Term Care* (RCP, 1998) acknowledged that the underuse of appropriate medication, such as antidepressants, may deprive older people of effective treatment. The second report *Medication for Older People* (Royal College of Physicians of London, 1997) found that there were increased benefits of drug therapy for older people, for whom both expectation and quality of life have improved. It cites the examples of angiotensin converting enzyme (ACE) inhibitors to control heart failure, treating hypertension to prevent stroke, thrombolytic therapy for acute myocardial infarction and anticoagulation for atrial fibrillation. The report also refers to new drug therapies for acute stroke, dementia and Parkinson's disease.

The National Service Framework for Older People (DoH, 2001) provided standards to ensure older people receive high quality care. An important part of the National Service Framework outlined how the use of medicine by and for older people can be improved.

The aim of the report was to ensure that older people achieve the greatest benefit from their medications in order to both sustain and improve their quality of life. The guidelines were also an attempt to ensure that the older person does not suffer needlessly from illness that may be brought about by excessive, inappropriate or inadequate consumption of medicines.

In Finland, Pitkala, Strandberg and Tilvis (2001) reported their randomised controlled trial to investigate what extent it is possible to reduce polypharmacy and simplify drug regimens by medication review. Their comprehensive patient assessment included medical history, physical examination, and assessment of physical, mental and cognitive function. They identified what they describe as an obvious limitation to the hypothesis underpinning their study:

"...the aim was to reduce the number of medications and simplify regimens. However, optimisation of drug therapy may include, aside from stopping unnecessary medication and simplifying the regime, the starting of new, necessary and useful drugs. Underuse of certain medications, e.g., cardiovascular drugs is also a health problem in the elderly"

Oborne, Batty and Jackson (1997) offered examples of using clinical information to assess appropriate prescribing. They suggested a rationale for monitoring elderly patients including appropriate steroid prescription in airways obstruction, the use of antithrombotics in atrial fibrillation for stroke prophylaxis, appropriate benzodiazepine

prescribing, the use of aspirin in ischaemic heart disease and angiotensin converting enzyme inhibitor with potassium sparing diuretics or potassium supplements (ACEIK). They proposed that prescriptions should be monitored to prompt clinical action.

In developing prescribing indicators for elderly medical in-patients, Oborne *et al.* (1997) developed three types of indicators to identify and improve suboptimal prescribing for older people. Indicators in group (a) were purely descriptive with no attempt to define an optimal value, e.g., the number of items prescribed per patient. Group (b) indicators reflected potentially harmful prescribing. Group (c) indicators assessed the appropriateness of prescribing specific drugs or combinations of drugs, e.g., benzodiazepines, co-prescription of digoxin with anticoagulants, or aspirin 300mg for patients in atrial fibrillation. In 2003, Oborne *et al.* reported on their audit of prescribing to patients resident in a random sample of nursing homes in England. Their objective was to modify the prescribing indicators in order to develop explicit, evidence-based criteria to assess the quality of prescribing to elderly nursing home residents. They successfully adapted 13 indicators to identify suboptimal prescribing for this client group.

In Sweden, Klarin, Fastbom and Wimo (2003) described drug use among the very old (84 years plus) with a focus on cardiovascular drug consumption. Over 90% were using drugs regularly or 'as needed' with polypharmacy, i.e., five or more drugs, especially common among the oldest. The most common were cardiovascular drugs, nervous system drugs

and drugs for the alimentary tract and metabolism. Significantly fewer of the cognitively impaired participants were treated with ACE-inhibitors and beta-blockers.

In their cross-sectional survey of drug use in residential care facilities for the elderly in the Los Angeles area, Williams *et al.* (1999) found there was frequent use of cardiovascular medications, which reflected the prevalence of cardiac disease in the elderly.

In her review of sensible prescribing for older people, Wynne (2003) identified drugs that are used for common medical conditions in older people and reviews their effectiveness and appropriateness. Wynne included thromboembolic prophylaxis in atrial fibrillation, the use of thrombolytic agents, ACE inhibitors aspirin and beta-blockers in the management of myocardial infarction, treatment of hypertension, hyperlipidaemia and osteoporosis and the use of medication affecting the central nervous system including antidepressant, antipsychotics and benzodiazepines.

Infections in long-stay units are particularly serious as residents live in close proximity, antibiotic resistant bacteria are common and many residents have compromised immune systems (Murtaugh and Freiman, 1995). There is general agreement that while influenza vaccine does not always prevent nursing home residents from becoming ill during an outbreak of pneumonia or influenza, it can reduce symptom severity. Despite the potential benefits of this medication, there is evidence that nursing home residents are not immunised (Coles, Balzano and Morse, 1992).

1.2.9 Inappropriate prescribing for older people

Buetow *et al.* (1996) undertook a systematic literature review of potentially inappropriate prescribing in general practice. They reported wide variations in prescribing rates and costs, and suggested that lack of consensus among doctors about the best way to practice medicine may help to account for the unexplained variations. Their findings support the assertions that inappropriate prescribing occurred during the 15-year period studied, but suggest that these findings were overestimated in the published studies.

In their UK study, Lindley *et al.* (1992) found that 27% of older patients on medication in a teaching hospital experienced ADRs. They concluded that much drug-related morbidity might be avoidable as it is due to inappropriate prescribing. In a study of frail elderly inpatients in 11 Veterans Affairs Medical Centres in the United States of America, using the Medication Appropriateness Index (MAI), Hanlon *et al.* (2004) reported that inappropriate prescribing was common and was related to polypharmacy and specific health status characteristics. 8.9% of drugs had no clinical indication. A further study of this group found that inappropriate prescribing is common for frail people, and is related to polypharmacy and specific health characteristics (Artz *et al.* 2004).

In their review of prescribing potentially inappropriate psychotropic drugs to the ambulatory elderly in South Dakota, Mort and Aparasu (2000) reported a high level of

inappropriate prescribing. Factors positively associated with potentially inappropriate prescriptions included older age, "seen before" status, and antidepressant class.

In their study of psychotropic medication withdrawal in New Zealand, Campbell *et al.* (1999) found that combining the withdrawal of potentially inappropriate psychotropic medication, namely benzodiazepines, any other hypnotics, or any antidepressant or major tranquillizer, with an exercise programme significantly reduced the risk of falling in home-based older people.

In Ireland, Sheehan, Twomey and Hyland (1996) found that 24%of elderly patients admitted to a geriatric medical unit in a teaching hospital were taking inappropriate medication. The most common reason for stopping a drug on admission was the researchers inability to find an indication for that drug. A further 11% of the drugs were discontinued due to side effects, and in 12% of cases because of known potential for side effects.

1.2.10 Prescribing patterns in long-stay care for older people

Beers *et al.* published explicit criteria for determining inappropriate medication use in nursing home residents in 1991. They found that criteria defining the inappropriate or inappropriate use of medication in this setting were not readily available and were not uniform. Beers used a two-round survey, based on Delphi methods, with 13 nationally

recognised experts to reach consensus on explicit criteria defining the inappropriate use of medication in a nursing home population. The 30 factors agreed on by this method identify inappropriate use of such commonly used categories of medications as sedative-hypnotics, antidepressants, antipsychotics, oral hypoglycaemics, analgesics, dementia treatments, platelet inhibitors, histamin blockers, antibiotics, decongestants, iron supplements, muscle relaxants, gastrointestinal antispasmodics and antiemetics. Beers cautioned that updating and expansion would be needed.

Subsequently, Beers (1997) updated and expanded these explicit criteria. The earlier criteria were designed to apply to only the frailest and sickest elderly populations. They were meant to serve researchers evaluating the quality of prescribing, drug utilisation review systems and educational efforts. They were designed to evaluate medication use in the absence of clinical information on diagnoses because of the relative inaccuracy of such information in nursing home records.

The new criteria are more limited than those previously published and are meant to apply to the general population of elderly persons rather than just the frailest and sickest resident in nursing homes. They categorise all criteria as the whether their adverse outcomes are less, or more serious. They also attempt to include information on clinical diagnoses.

Aparasu and Mort (2000) reviewed current literature applying the early Beers criteria for inappropriate medication use in the elderly to prescribing in various settings. They included eight studies in various health care settings; the reported prevalence of inappropriate medication in the elderly varied from 14% in the community to 40.3% in nursing homes. The total number of prescriptions was positively associated with the increased use of inappropriate medication use: other risk factors suggested included being female, over 80 years of age and being a Medicaid beneficiary. They noted that the Beers criteria are only a subset of all inappropriate medication use, and therefore studies using these criteria to quantify inappropriate use may underestimate the problem.

In 2002, Liu and Christensen reviewed 11 studies from the current literature applying the revised Beers criteria applied in various settings for older people. Based on these studies, they reported a persistently high prevalence of inappropriate prescribing in the elderly, with nursing home residents generally more vulnerable than other older people. The reported prevalence of elderly patients using at least one drug ranged from 40% in nursing home residents to 21.3% for community-dwelling older people. The most significant risk factor for receiving an inappropriate medication was found to be the total number of prescribed drugs being taken.

Curtis *et al.* (2004) sought to determine the extent of potentially inappropriate outpatient prescribing for elderly patients, as defined by the Beers revised list of drug to be avoided in elderly populations. Their large retrospective cohort study used outpatient prescription

databases in Arizona. 21% of subjects filled a prescription for one or more drugs of concern, 15% for two drugs of concern and 4% for three or more drugs of concern. The most commonly prescribed classes were psychotropic drugs and neuromuscular agents. McCleod *et al.* (1997) designed a study to determine the usefulness of a computer-based intervention, coupled with expert assistance with prescribing decisions, to reduce inappropriate and questionable prescribing. They found the Beers criteria 'unacceptable' for their purposes. Specifically, they disagreed with the designation of some of the drugs as inappropriate for prescription for elderly people. They developed their own list and presented this to a national consensus panel. 71 practices were identified which fell into three categories: drugs generally contraindicated for elderly people, drug-disease interactions and drug-drug interactions.

Based in a six-doctor inner-city training practice, Khunti and Kinsella (2000) studied the effect of systematic review of medication by general practitioners on drug consumption among nursing home residents in four randomly selected homes in the United Kingdom. Items were stopped if they were considered inappropriately prescribed or unnecessary. Prescriptions were altered in 65% of the residents: 51% had an item stopped and 26% had an item changed to a cheaper alterative or the dose reduced.

In their review of medicines management in care home for older people, Cowan *et al.* (2002) state that polypharmacy is particularly prevalent in care homes for older people in England, and report a mean of 5.7 medicines currently prescribed for men and 5.5 for

women. They suggest that polypharmacy itself may not necessarily be a bad practice. The broader term of 'inappropriate prescribing' is more useful because it also relates to adverse effects arising from prescribing practices in addition to unnecessary polypharmacy, including under-use of certain medicines. Elsewhere, Oborne *et al.* (2003) reviewed 22 nursing homes and reported that the residents were receiving a mean of 5.1 regular items.

In their controlled observational study of quality of care for elderly nursing home residents in Bristol (cases) matched with older people living in the community (controls), Fahey *et al.* (2003) suggested that the residents were receiving inadequate care. This included both insufficient use of beneficial drugs and overuse of inappropriate or unnecessary drugs. Cases were prescribed a mean of 5.8 drugs and controls a mean of 4.9 drugs.

In their review of drug prescribing in a long-stay unit in Ireland, Doona *et al.* (1996) and reported an average of 6.1 drugs per resident, with a range of 1-12. O'Grady and Weedle (1998) also reviewed prescribing in a similar unit and reported an average of 4.1 medicines per patient, with a range of 0-13. All short-term medications, e.g., antibiotics were excluded from this analysis. Nolan and O'Malley (1989) reported that 41% of residents in 11 Irish nursing homes studied were taking 5 or more drugs. They also examined polypharmacy and drug-drug interactions. The proportion of patients prescribed potentially interacting combinations increased markedly with the number of

drugs taken, as did the mean number of potential interactions per patient. Overall, 54% of those who were taking two or more medications and 42% of all patients were prescribed at least one potentially interacting combination.

Bradley *et al.* (1999) surveyed medication use in residential care facilities for the elderly. The average number of medications per resident was five: 94% of the sample took at least one medication. Cardiovascular drugs, central nervous system drugs, analgesics, diuretics and potassium supplements were most commonly used. The frequency of psychotropic drugs without a corresponding indication suggested prescribing for symptoms rather than documented medical conditions.

In their audit of three Swedish nursing homes, Linne and Liedholm (2003) reported the mean number of prescribed drugs as 9.6, with 28% of residents given neuroleptic drugs.

In their randomised controlled trial of nursing homes in Manchester, Furniss *et al.* (2000) reported the mean number of drugs for all residents was 4.91 with a range of 0-7. In 54% of cases, prescribing of neuroleptics was inappropriate, which is higher than other studies such as McGrath and Jackson in Glasgow (1996).

An increase in drug use following admission to Dutch nursing homes was reported by Koopmans *et al.* (2003). There was a minor but statistically significant increase in the mean number of drugs from 5.6 on admission to 5.8 six weeks later. Six weeks after admission a significant increase in drugs for the central nervous system and for the

sensory organs. They conclude that increase in drug use does not necessarily have to reflect bad prescribing practice.

In three Singapore nursing homes, Mamun *et al.* (2004) surveyed medication use using the Beers criteria, and concluded that the prevalence of polypharmacy (5 or more medicines) and inappropriate medications was high. Residents were on an average 5.32 medications.

Clarke and McCormack (2003) described prescribing practices in an Irish service for older people. Data collected per patient included medical diagnosis, age and medication prescribed. Paired data was collected for 52 patients at baseline and again at six months. They reported a mean of 9.2 medications per patient. Most prescription were for CNS preparations (42%), Cardiovascular (16%), gastrointestinal (16%) and respiratory (6%). Despite regular consultant review, the numbers of prescriptions were not reduced, and PRN prescription increased, with medication changing in nature over time.

In a sample of Dutch nursing homes, Van Dijk *et al.* (2000) undertook a retrospective study to quantify and evaluate drug utilisation. For each therapeutic drug group the numbers of users was determined. The ten therapeutic groups used most frequently were investigated further. During the study period 89% used a drug from the Anatomical Therapeutic Chemical classification (ATC) code N (nervous system), A (alimentary tract) and C (cardiovascular system). Eight of the ten therapeutic drug groups prescribed most

frequently were used for more than 50% of the time. In particular, psycholeptic drugs, diuretics and laxatives were used chronically (83%, 81%, and 80% of the nursing home stays respectively). They concluded that drug utilisation in the long-stay units was high and that many of the drugs were used chronically.

In the south of Glasgow, McGrath and Jackson (1996) surveyed the prevalence of neuroleptic prescribing in 28 nursing homes utilising the guidelines from the American legislation. The guidelines stated that neuroleptics are appropriate for either psychotic disorders or organic mental syndromes associated with specific psychotic and non-psychotic behaviours, that present danger to the resident or others, or that interfere with the ability of others to care for that person. This does not include wandering, poor self care, restlessness, impaired memory, anxiety, insomnia, unsociability, indifference to surroundings, fidgeting, nervousness, depression without psychosis, uncooperativeness or agitation that is not dangerous). Most residents receiving neuroleptics in their study (88%) could be deemed to be receiving them inappropriately according to the guidelines. They also found that 4% of the residents who were receiving antipsychotics were prescribed more than one antipsychotic drug.

Oborne *et al.* (2002) undertook a cross-sectional survey of prescribing in nursing homes in England, reporting that only 17.8% of residents who were prescribed neuroleptics received appropriate therapy. Their aim was to develop an indicator of appropriate neuroleptic prescribing based on the American Omnibus Reconciliation Act 1990, and to

determine whether referenced ranges of observed prescribing could be derived that would negate the need to collect clinical data. The results reflected that they were unable to derive referenced ranges of observed prescribing. They suggested that notes-based information may reflect the quality of documentation, and recommend patient assessment as the key to the review of drug regimen efficacy.

In fifteen Swedish nursing homes, Schmidt *et al.* (1998) collected data within the context of a controlled trial with the primary aim of exploring the effects of regular team interventions on drug prescribing. Unclear indication and problematic choice of drugs were the most common drug-related problems discussed by a team consisting of a pharmacist, a physician, nurses, 'undernurses' (similar to licenses practical nurses) and nurses aides. After drug choice the second most discussed problem was unclear clinical indication, with one third of these relating to drugs prescribed on an 'as required' basis. Ninety per cent of problems raised resulted in action being taken.

The 2001 National Sentinel Clinical Audit (PCP 2001) identified the documentation of maximum daily doses for 'as required' prescriptions as a key marker for quality. The frequency of the maximum dose being documented rose from 39% in 1999 to 63% a year later in the nursing homes surveyed.

In Australia, Roughead *et al.* (2003) describe the development of services supporting appropriate medications management in the elderly in aged care facilities. National

practice guidelines for medication management in long-stay care facilities have been incorporated into accreditation standards. Since the national and professional practice standards have been developed, medication advisory committees are currently operating in many long-stay facilities. Effectiveness has been evaluated by measuring changes in medication use or health care outcomes as well as actual or potential cost savings.

In 2002, The National Council on Ageing and Older People published *Protecting Our Future: report of the Working Group on Elder Abuse.* The report identified that recognising what constitutes good practice, and establishing and maintaining it, is key to the prevention of elder abuse on institutional settings. Included in the list of unacceptable treatments are the over- or under-medication of older people. One of the recommendations of the working group was the introduction of policies and procedures for best practice, including the adoption of drug administration policies.

The report *Care Homes for Older People National Minimum Standards* (DoH 2003) requires all care homes in the United Kingdom to have a policy for drug administration, and evidence that staff adhere to the stated procedures for the receipt, recording, handling, administration and disposal of medicines within a risk management framework. It further states that service users, i.e., residents, should be able to take responsibility for their own medication if they wish.

1.2.11 Prescribing patterns in the community for older people

In a study by the National Institute for Social Work in the UK, Moriarty (2001) reported that although people with dementia are at greater risk of entering long-term care, it should be remembered that there are almost as many people with severe or moderate dementia living in the community, as there are in residential and nursing care. In 1995, Walley and Scott reported that elderly nursing home residents in Liverpool received up to four times as many prescriptions as older people living in their own home.

In their secondary analyses of the survey of disability among disabled residents aged 65 or more (without mental handicap) in communal establishments in Great Britain, Kavanagh and Knapp (1998) reported that disabled elderly people in residential and nursing homes consulted general practitioners more often than their counterparts living in the community (mean 8.9 versus 6.3 times per year). They suggest that systematically higher levels of utilisation in nursing homes may not be associated simply with the higher dependency of their residents but may be due to better management of residents' medical care. A 1996 study of an elderly rural population in Pittsburgh, Lassila *et al.* (1996) reported the use of a greater number of medicines was independently and statistically significantly associated with older age, hospitalisation within the previous six months, home health care in the previous year, a visit to a physician during the last year and insurance coverage for prescription medication. Individuals over the age of 85 years were significantly more likely to be taking cardiovascular drugs, anticoagulants, vasodilators,

diuretics and potassium supplements. More women than men were taking non-steroidal anti-inflammatory drugs, antidepressants, potassium supplements and thyroid replacement medications.

The functional abilities of older people living in the community in north London were reported by Iliffe *et al.* (1991), who found that 81.2% of the patients studies were able to walk outdoors unaided: however, nearly one in five was incontinent. Reporting on the patterns of support networks among community dwelling elderly in urban Ireland, Kirby *et al.* (2000) found that they had high level of informal support, and suggested that this may be a factor in the lower rates of depression found in Dublin when compared with New York or London. In community dwelling older women in Amsterdam, a twofold risk of severe depression has been associated with metabolically significant vitamin B_{12} deficiency (Penninx *et al.* 2000).

In their cohort study of community dwelling older people in Minneapolis, Hanlon *et al.* (2002) determined the prevalence and predictors of inappropriate drug prescribing, and found that it was common and persisted over time. Polypharmacy has also been reported in this group, with 29.7% of people over 75 years taking three or more prescribed medicines (Iliffe *et al.* (1991). In Italy, Nobili *et al.* (1997) reported a high level of drug consumption in older people in the community, with nearly all people (95% of the women and 91% of the men taking at least one medication. Cardiovascular, nervous system and alimentary tract drugs were the most frequently used.

In their study of self-medication with over-the-counter (OTC) drugs in North Carolina, Amoako *et al.* (2003) reported ninety per cent of older people reported pain as the symptom treated most frequently when they were responsible for their own health care decisions.

In her large prospective questionnaire study among elderly patients attending a hospital clinic in the UK, Gupta (2002) found that older people in the community with established risk of stroke had poor understanding of their predisposition, and were therefore not seeking medical help and early treatments.

1.2.12 Prescribing influences

In their review of the literature of factors affecting drug prescribing, Hemminki (1975) concluded that prescribing is a complex decision-making task, influenced by many non-medical factors. They suggested that both education and the age of doctor positively influence the quality of prescribing care, but that the contribution of advertising by drug firms was debateable. The influence of colleagues had some influence: however, these were secondary to the aforementioned. These studies suggested a positive effect of control and regulation measures if used effectively. Hemminki suggests that the perception that demands from society and patients increases prescription rates is based on personal views rather than thorough studies.

In their questionnaire study, Cockburn and Pit (1997) examined the effect of patients' expectations for medication and doctors' perceptions of patients expectations on prescribing for 22 general practitioners in Australia, and found that although patients brought expectations to the consultation regarding medication, the doctors' opinions about their expectations were the strongest determinants of prescribing.

In their 2003 study, Cutts and Tett identified factors influencing the prescribing of medicines by general practitioners in rural areas in Australia, and found that these included practice location and limited diagnostic testing. Other factors such as access to continuing medical education and specialists were confirmed as having an influence on prescribing.

Differences in opinion about prescribing practices were also found by Ashworth, Golding and Majeed (2002) when they examined the prescribing incentive schemes used by primary care groups in London. Opinions varied about the same indicators and there was a diverse range of prescribing indicators.

In her discussion of the forces in the marketplace for medical care, Muller (1972) described an "overmedicated society" and cited pharmaceutical advertising and the need to impose some constraints on the behaviour of the drug companies as ways to modify the use of drugs.

In a retrospective cross-sectional study of 252 nursing homes in the USA, Williams and Betley (1995) found that medication review is usually prompted either by the resident being prescribed an extensive list of drugs or where staff or family have noticed side effects. A study of 173 Tennessee nursing homes found that another influence affecting the use of antipsychotic drug use was whether the physician was working single-handed (Wayne, Federspiel and Schaffner, 1980).

In an evaluation of the effects of an educational programme to reduce antipsychotic use in nursing homes in Tennessee, Meador *et al.* (1997) undertook a randomised controlled trial in twelve sites. They found that a provider education that included both physicians and nursing staff could reduce the use of antipsychotics with no increase in behavioural disorders. In a review of the elements that affect prescribing practice, Becker *et al.* (1972) observed that these have often been attributed to deficiencies in educational elements, including postgraduate medical curricula.

1.2.13 Using formularies in clinical practice

In considering indices of prescribing quality, Robertson *et al.* (2001) introduced the concept of general practitioners using so-called 'personal formularies". They found that most doctors work within a limited list of medications that they find effective and relatively free from side effects. This can be viewed as a personal formulary, which is generally not written down, has developed as a habit rather than rational thought, and has

been shaped by colleagues, patients and experience. They can also be shaped by the pharmaceutical industry, in that apparent changes in prescribing practice may say more about successful drug marketing than appropriate decision making. These are the drugs that are prescribed regularly and constitute the bulk of the prescribing undertaken by the doctor.

In the light of expenditure of medicines coming under scrutiny, Ferrow *et al.* (1997) described how the Scottish Office Management Executive required each health board in Scotland to produce a joint hospital/general practice formulary, with the aim of promoting safe, effective and economical prescribing. Bochner *et al.* (1996) also find evidence that formularies can reduce expenditure.

In their questionnaire survey of 500 large hospitals in the UK, Joshi, Williams and Petrie (1994) found that 90.9% of them had drug formularies. However. Only two had joint hospital/general practice formularies. The content of the formularies varied, with only seventeen providing costs, but most including some prescribing information. They found that "improving the quality of prescribing" was considered the most important reason for reason for the formulary. Both therapeutic efficacy and safety were considered to be of the highest importance. More than half of the respondents described their general attitude to the use of a formulary as supportive.

In a 1989 survey of a random sample representative of readers of Drug and Therapeutics Bulletin (Drug and Therapeutic Bulletin, 1989) over half of those responding said they used a formulary; 66% of those who did not said it was because no formulary existed. Since choice of drug is restricted by a formulary, in hospital these are usually the only drugs stocked and therefore immediately available. The bulletin goes on to report that the Department of Health had recently instructed District Health Authorities to plan for the introduction of a full formulary system. In a later report (Drugs and Therapeutics, 1991), the introduction of formularies to general practice is discussed. It described three formularies, which had been published using explicit criteria for efficacy, safety, convenience and cost. However, Feely (1986) points out that general practitioners may find it difficult to adhere to such guidelines for good practice in areas such as generic prescribing, as patients may be disconcerted or confused by a change of trusted medication, and doctors therefore prefer to maintain them on their usual brand of medication.

In an overview of the role that pharmacoeconomic analysis plays in formulary decisions, Johnson and Bootman (1994) recommend that economic information should inform decisions when developing drug formularies.

In their UK survey, Joshi, Williams and Petrie (1994) reported 46.7% of drugs and therapeutics committees, which are the body responsible for overseeing formulary management, included nurses. In French hospitals and clinics, Spath *et al.* (2003)

reported that the formulary committee, at the specific request of the French Clinical Pharmacy Association, included nursing representation, makes all decisions concerning the selection of medicines.

1.2.14 Drug utilisation and medication reviews for older people

Hanlon *et al.* (1992) stated that drug utilisation reviews (DURs):

"...use consensus opinion of drug therapy experts to define standards or explicit criteria for a single class of drugs, class of drugs or group of drugs. DURs typically use retrospective information from large, non-clinical administrative databases to identify problems such as dosage range, duration, therapeutic duplication and drug interactions".

Hanlon *et al.* (2002) identified two sets of inappropriate drug-use criteria: firstly, DUR with respect to doseage, duplication, drug-drug interactions, duration and drug-disease interactions and secondly drugs-to avoid.

In a comparison of the services provided by consultant pharmacists in the United Kingdom and the United States, Sommerville (1997) took into consideration that in the latter it is a federal requirement. In both countries the role of the pharmacist is to review medication on a regular basis and communicate irregularities to either the medical or nursing staff, according to the feedback. She pointed out that these services provide

quality audit reports and can improve the quality of life for residents. However, this model requires dedicated time by pharmacists.

Rollason and Vogt (2003) undertook a systematic review of the role of the pharmacist in the reduction of polypharmacy in the elderly. They identified 14 studies that met their inclusion criteria, namely randomised controlled trials involving older people and pharmaceutical interventions that resulted in an outcome expressed in terms of the reduction in medication. Positive results in nursing home residents seemed more difficult to obtain with five positive studies and five negative studies. They emphasise that it is difficult to assess whether the reduction in number of drugs benefited the patients.

In Scotland, Krska *et al.* (2001) studied the effect of medication review led by a pharmacist on resolution of pharmaceutical care issues, medicine costs, use of health and social services and health-related quality of life. They concluded that pharmacist-led medication review does have the capacity to identify and resolve pharmaceutical care issues.

In their randomised controlled trial in the United Kingdom, comparing clinical medication review by a pharmacist against normal general practice review, Zermansky *et al.* (2001) found that patients reviewed by the pharmacist were more likely to have changes made to repeat prescriptions and have a smaller rise in the number of medicines. Monthly costs rose in both intervention and controls, but the rise was less in the

intervention group, a difference of £61 per patient a year. There was no evidence that review of treatment by the pharmacist affected practice consultation rates, outpatient consultations, hospital admissions or death rate. In their report on a simple, inexpensive pharmacist-based programme to screen for medication problems after initiation of new medicines in California, Seevak *et al.* (2003) found the cost was 6.40 US dollars per patient.

Recently, Williams *et al.* (2004) investigated the short-term effect of interdisciplinary medication review on function and cost in ambulatory elderly people in Richmond, Virginia. The Medication Adjustment Team comprised a physician, nurse and consultant pharmacist. The Medical Appropriateness Index was used to assess individual drug appropriateness (Hanlon *et al.* 2002). Despite the intervention both reducing medications taken and cost, they found that most elderly patients were resistant to reducing their medications to the recommended level. They suggested that more information is needed to explore the reasons for this resistance in order to develop better strategies for DURs.

1.2.15 Management of older people with physical and cognitive impairment

Assessment tools specific to long-term care for older people have recently been developed to meet the need for standardisation. Bernabei *et al.* (1999) describe the use of the SAGE (Systematic Assessment of Geriatric drug use via Epidemiology) database to study the relationship between treatments received and outcomes experienced in frail

older people. As part of the study of nearly 300,000 certified nursing homes in five U.S. states, they reviewed residents' physical and cognitive status. They found that although cognitive function was considered normal in as many as fifty per cent of residents (range: Maine 49% - South Dakota 59%), only 17% were independent or required only limited assistance in performing the activities of daily living (range: Maine 12% - Kansas 30%). 43% of residents had dementia and 20% a stroke. This large and comprehensive database reflects the extensive proportion of institutionalised older people who have problems with physical and cognitive impairment, with poor physical status the largest reported limitation for this group.

The Activities of Daily Living (ADLs) described by Roper, Logan and Tierney (1990) include eating and drinking, personal hygiene, elimination, mobility and maintaining a safe environment. In their prospective observational study in two hospitals in Ohio, Covinsky *et al.* (2003) found that many (35%) hospitalized older people are discharged with ADL function that is worse than their baseline function. Stein *et al.* (1993) reported on increasing level of physical and mental ill health in residents entering homes, which has resulted in raised dependency levels. A higher mean number of impairments in ADLs, measured by Barthel scores, were reported by Chu and Pei (1998) as a risk factor for early readmission for elderly medical patients in Hong Kong: living in an old age home reduced the risk. Measurements of these daily functions are one of the major outcomes used to assess interventions in dementia such as drug treatment (Jones, 2003). Resnick (1999) suggests that poor prescribing practices are a factor in the motivation to perform activities of daily living institutionalised older adult.

In considering how far to investigate older people, Adler and Stott (2003) suggest that since severe physical disability becomes increasingly common with ageing, simple and quick questionnaires such as the Barthel score should be used routinely to assess basic activities of daily living in all frail older patients. Pitkala, Strandberg and Tilvis (2001) reported on a cohort of older people who were more dependent in their activities of daily living than a comparison group, and found that they were using significantly more daily doses of medication the less disabled group.

Dementia is an acquired impairment of intellectual function and other cognitive skills that leads to a decline in the ability to perform daily activities as well as to behavioural changes (Jones, 2003). A decline in memory, especially in the learning of new information, is almost always a feature. In addition, there is a decline in other cognitive abilities, characterised by deterioration in judgement and thinking, such as planning and processing, and in the general processing of information. Dementia and ageing are not synonymous (Small *et al.* 1997), however it is a common problem in institutionalised older people. Adler and Stott (2003) suggest that, in view of the different diagnostic criteria for dementia, great caution should be exerted in the use of the term 'dementia' and instead it would be preferable to use the term 'chronic cognitive impairment' for which they advocate the routine use of standard tool such as the Mini-Mental State Examination (MMSE).

In their investigation of whether depressive symptoms predict cognitive decline, Paterniti et al. (2002) utilised the MMSE to evaluate cognitive decline, and concluded that high levels of depressive symptoms, when persistent, were associated with cognitive decline in their sample of elderly people. Bartels et al (2003) also reported that dementia complicated by mixed agitation and depression accounts for over one-third of complicated dementia, and is associated with multiple psychiatric and medical needs, intensive pharmacological treatment, and use of high cost services.

Cognitive assessment is central to diagnosis and management of dementia. The MMSE (Folstein 1975) is the most widely used brief measure of cognitive function, and is appropriate for intermittent routine use. Despite limitations, it is the standard screening test for detecting cognitive impairment in older people (Jones, 2003). It is also recommended by the National Council for Clinical Excellence (NICE 2001) as a brief assessment for following the response to anti-dementia drugs.

Recent advice from an independent review carried out by the Consumer' Association and published in the Drug and Therapeutic Bulletin (2003) suggests that when managing disruptive patients, non-drug interventions should be tried first. Such measures include the remedy of hearing or visual problems, reviewing the environment, and asking friends or family about remedies that have worked in the past. There are also a range of behavioural approaches that include physical activity and environmental intervention (Alessi *et al.* 1999), occupational therapy, sensory stimulation (Lyketsos *et al.* 1999) and

aromatherapy (Ballard *et al.*, 2002) that may prove helpful. It has been suggested, however, that studies to date have not proved convincing evidence of benefit (Drugs and Therapeutics Bulletin 2003b).

Before commencing drug therapy it is recommended that a diagnosis of delirium or acute confusional state (Nayeem and O'Keefe 2003) be considered when a patient is thought to be confused or uncooperative.

The term "behavioural and psychological symptoms of dementia" (BPSD) has been proposed to describe the spectrum of non-cognitive manifestations of dementia that include verbal and physical aggression, agitation, psychotic symptoms (hallucinations and delusions), sleep disturbances and wandering. (Cohen-Mansfield and Billig, 1998). Previously typical antipsychotic (neuroleptic) drugs were the most common treatment, but recently atypical antipsychotics have been widely adopted, because they are perceived to have superior efficacy and safety. However, in their review of the role of these drugs in BPSD, using selected double blind randomised controlled trials, Lee *et al.*. (2004) found limited evidence of improved efficacy and adverse event profiles in these newer drugs compared with typical antipsychotic drugs.

The use of psychotropics in the non-demented and demented elderly in Finland was described by Hartikainen *et al.* (2003). They found that psychotropics, especially antipsychotics, are more commonly used in the treatment of both demented and non-demented elderly even without proper indication such as psychotic symptoms. They

suggest that it is possible that depressed elderly people are prescribed antipsychotics rather than antidepressants.

However, Macdonald *et al.* (2002) estimated the prevalence of dementia and psychotropic medication in nursing homes in South East England. They used the MMSE to assess cognitive impairment and validated these against independent psychiatric assessment in a sub-sample of residents. They reported that 74% of residents (n=445) had probable clinical dementia: 38% of residents had cognitive impairment. Mozley *et al.* (2000) reported a higher prevalence with 90% of a sample of admissions to residential and nursing homes in Lancashire showed signs of cognitive impairment. MacDonald *et al.* (2002) suggested that if nearly three-quarters of nursing home residents have dementia, many with behavioural disturbances, then there is no support for the hypothesis that the use of antipsychotic drugs in nursing homes is excessive.

Ryan *et al.* (2002) explored the origins of the regulation of the use of psychotropic drugs in nursing homes, reviewed controlled trials of these drugs in nursing homes, examined the role of these agents in adverse drug events experienced by nursing home residents and proposed policy and research areas that merit consideration. They suggested that in addition to randomised controlled trials to study the efficacy of psychotropic medications, other non-pharmacological behaviour management approaches, and innovative staffing and training strategies need more study.

In their two-year prospective, longitudinal study in subjects with dementia in Oxford, McShane *et al.* (1997) reported that the use of neuroleptic drugs was associated with an increased rate of cognitive decline. They suggested that since the frequency of use of neuroleptics has varied widely, the differences in institutional practice contributes substantially to prescribing decisions.

Fahey *et al.* (2003) developed a list of quality indicators as a basis for outcome measurements in their vulnerable population of nursing home residents in Bristol. They reported that over a quarter of nursing home residents were taking neuroleptic drugs, a significantly higher proportion than community dwelling older people.

In Ireland, Nolan and O'Malley (1989) reviewed prescribing practices for private nursing homes. They found that 65% of residents were taking psychotropic drugs: prescribing patterns varied considerably between the eleven homes under study, and psychoactive drug use related to nursing home size. Other studies such as Ray *et al.* (1980) reported no difference. Nolan and O'Malley suggested that these differences may reflect the extent to which drug consumption is dependent not only on individual physicians prescribing practice but also on patient illness.

Following their two-year prospective, longitudinal study in Oxford of 71 subjects with dementia, McShane *et al.* (1997) concluded that neuroleptic drugs that are sometimes used to treat behavioural complications of dementia may worsen already poor cognitive

function. They recommended randomised controlled trials to confirm a causal relationship.

In Washington D.C., Gillick and Mendes (1996) undertook a study to determine whether nurses working in long-term institutions, who are knowledgeable about the full range of conditions common among older people, favour limitations in treatment in old age. Participants completed an intervention-specific advance directives for themselves in old age: these included dementia plus chronic illness, and chronic illness in a nursing home, as opposed to community dwelling, compared to a robust older person living at home. The nurses expressed strong preferences about limiting a variety of interventions in old age. The greater degree of physical and cognitive impairment, the more limitations they favoured.

With frail older people, especially those that are most physically vulnerable, Gilbert *et al.* (1993) found that overuse of medication, potentially leading to adverse effects, was a particular problem in aged care facilities in Adelaide.

In 2003, Nygaard *et al.* (2003) investigated drug use in nursing home residents in Norway, and compared those residents who were mentally intact with the mentally impaired. Mentally intact residents were prescribed more medication of all types, in particular hypnotics, cardiovascular and pain-relieving drugs. Mentally impaired residents were at a greater risk of not receiving appropriate treatment for their complaints, but were therefore less liable to suffer from hazards caused by inappropriate drugs. In

their randomised controlled trial of ten pairs of Tennessee nursing homes, Stein *et al.* (2001) also cautions that the evaluation of the effects of interventions in nursing home residents, in this case the effects on pain and function, may be problematic because of cognitive impairment or poor comprehension.

1.3 Markers for quality in prescribing for the institutionalised older person

The National Medicines Information Centre (NMIC 2000) has suggested a list of problems inherent in prescribing for institutionalised older people. The list is given in the table below.

Table 1.5 Problems inherent in prescribing for older people

Overuse of antipsychotics
Overuse of sedatives
Inappropriate prescribing of laxatives
Overuse of home nebulisers
Lack of medication review
Multiple prescribers
Nurse initiated prescribing
Excessive use of catheterisation
Inappropriate timing of medicine administration rounds
Use of one patient's medicines for another

1.3.1 Use of antipsychotics in the older person

As previously discussed, there is wide agreement that the use of antipsychotics in older people is problematic (Beers *et al.*, 1991, McGrath and Jackson, 1996, Hartikainen, 2003 and Wynne 2003). McGrath and Jackson (1996) reported the high rate of 88% of residents receiving neuroleptics that could be classified as inappropriate. They suggest that residents were prescribed the medication for a number of behavioural characteristics, which are often found in institutionalised older people, including restlessness, wandering, agitation or uncooperativeness. In the Netherlands, Van Dijk (2000) also reported chronic use of psycholeptic drugs, with 81% of residents in the study receiving them long-term. However, other studies such a Linne and Liedholm (2003) in Sweden found a lower rate of 28% of residents prescribed neuroleptics.

In contrast, Macdonald *et al.* (2002) have a different viewpoint on the use of psychotropic drugs in nursing homes. They estimated the prevalence of dementia and psychotropic medication use in nursing homes in South East England. They used the MMSE to assess residents for cognitive impairment, and found a strong association between antipsychotic use and both MMSE score. Macdonald *et al.* concluded that, since nearly three-quarters of the residents had probable clinical dementia, many with behavioural disturbance, then there was no support for the hypothesis that the use of antipsychotic drugs in nursing homes is excessive.

1.3.2 Use of antidepressants in the older person

Brodaty *et al.* (1993) found that the old may recover better from functional mental illness as well if not better than the young. There is no doubt that depressive symptoms are more common in the elderly than in younger adults, and are more likely to be linked with losses and life events: however, it remains uncommon for older people to be referred for any kind of psychotherapy (Evans 1998).

Evans and Katona (1993) estimated that up to 35% of older people in the community suffered depression. The Audit Commission (2000) found that 20% of residents of homes are receiving antidepressants, although 40% are likely to have depression.

Although the diagnosis of depression may be difficult in people with dementia, approximately 40-50% may have depressive symptoms at some stage (Katona *et al.*, 1998).

Van Eijk *et al.* (2001) studied antidepressant drugs for elderly people for their randomised controlled trial of group versus individual academic detailing. This was because previous studies identified that a substantial number of the elderly are prescribed highly cholinergic antidepressants despite their greater susceptibility to hazardous side effects such as dry mouth, blurred vision, constipation, urinary dysfunction, hypotension, tachycardia and cognitive impairment. Many of these side effects may prompt the introduction of further drug therapy.

1.3.3 Use of laxatives in the older person

Since there have been few comparative studies, Petticrew, Watt and Sheldon (1997) undertook a systematic review to determine the effectiveness and cost of laxatives in the prevention and treatment of constipation in the elderly living in the community. Their conclusions were that as there were few comparative studies, and the trial had been so small, it was difficult to determine what constitutes effective treatment of constipation in the elderly.

A recent audit of chronic constipation in the community (Addison *et al.* 2003) which included people in nursing or residential homes, reported just under half those surveyed were chronically constipated despite taking regular laxatives.

Shepherd (1998) suggested that social and cultural pressures may encourage therapeutic interventions in older patients, at the expense of alternative actions including changes in lifestyle, such as administering laxatives instead of adjusting the person's diet.

1.3.4 Use of hypnotics in the older person

In their study of the requests for hypnotic drugs prescribed to elderly hospital patients, Bayer and Pathy (1985) found that most of the active hypnotic drugs were unnecessary

and a majority of those requesting hypnotics consistently responded to placebo. They suggested that clinical training in the management of sleeplessness is generally poor, and a casual attitude to the prescribing of hypnotics in hospital might be expected to influence adversely the future prescribing habits of the majority of junior doctors who move into general practice.

Reynolds *et al.* (1985) suggested that is difficult to justify the widespread use of sleeping tablets in this client group. Many of the residents have spent considerable time in a general hospital, where hypnotics are widely prescribed prior to admission to long-stay care (Griffith and Robinson 1996).

A project related to the use of aromatherapy with older people in Tullamore General Hospital reported a reduction of 49% in the use of night sedation (Cannard 1995, Cannard, 1997).

There are many non-pharmacological interventions for insomnia: a recent Cochrane Review suggested that physical exercise taken regularly may promote relaxation and raise core body temperature in ways that are beneficial to initiating and maintaining sleep (Montgomery and Dennis 2003). Sleep patterns are now one of the activities of daily living that are assessed as part of the nursing process (Salvage and Kershaw 1990). Strachan-Bennett (2004) found that noise reduction could dramatically improve the quality of sleep in patients. Simple measures were effective, such as stopping the use of

intercoms and pagers at night, closing patients' doors, lowering the alarm volume on equipment and changing to quieter paper towel dispensers.

The Report of the Benzodiazepine Committee (DoHC 2002) suggested that although benzodiazepines are effective, safe and approved hypnotics for the short-term treatment of insomnia, their use should be limited to between 2 and 4 weeks. It recommends that all hospital and other institutional healthcare providers ensure that patients are not initiated unnecessarily on these drugs. Using data derived from the Saskatchewan Health linked databases, Neutel *et al.* (1996) found a strong association between a first prescription for benzodiazepines and subsequent falls. In identifying risk factors for hip fracture in older women, Elon (1996) includes the use of long-acting benzodiazepines.

1.3.5 Use of analgesics in the older person

Relief from pain in older people in institutions is an important consideration where one of the prime aims is to improve quality of life for the individual (Ingham and Fielding 1985). A survey of older people in the community in Ireland (HeSSOP 2001) found that pain had been experienced by over a third of the respondents in the past week.

Goff (1999) suggest that chronic pain can manifest itself as depression, eating disturbances or sleep disturbances. It may be due to muscle and joint pain, neuralgia, vascular pain, diabetic pain, terminal cancer pain or central post-stroke pain. She

concludes that the cognitively impaired and nonverbal patient is the most difficult to assess and require astute observation.

In her survey of nurses' knowledge about pain and pain control, Closs (1996) found that there was a misconception that pain is an unavoidable consequence of growing old, and that the analgesic effect of a given dose of drug increases with age.

1.3.6 Use of non-steroidal anti-inflammatory drugs in the older person

Older people are at higher risk of having an adverse reaction when prescribed NSAIDs than younger people. Therefore, before prescribing oral NSAIDs to older people, medical staff should consider either topical preparations or other forms of therapy (Johnson, Quinn and Day 1995). Owing to the increased susceptibility of the elderly to the side-effects of NSAIDs, the BNF (2003) gives recommendations for their use, including:

- For osteoarthritis, soft tissue lesions and back pain, first try measures such as weight reduction (if obese), warmth, exercise and use of walking stick;
- For osteoarthritis, soft tissue lesions, back pain and pain in rheumatoid arthritis, paracetamol should be used first and can often provide adequate pain relief
- Where a NSAID proves necessary, start with a low dose, and consider prophylaxis of NSAID-induced peptic ulcer.

1.3.7 Use of stroke prophylaxis in the older person

In their development of objective measures for good quality prescribing practice in the older person, based on clinical information, Oborne, Batty and Jackson (1997) included antithrombotics in atrial fibrillation for stroke prophylaxis as a marker for quality prescribing.

A low dose of aspirin is used for the secondary prevention of thrombotic cerebrovascular or cardiovascular disease. In the treatment of atrial fibrillation in the elderly, anticoagulation is indicated: aspirin is less effective than warfarin but may be appropriate if there are no other risk factors for stroke (BNF 2003).

An algorithm for assessing appropriateness of prescribing anti-thrombotics developed by Oborne *et al.* (1997) was also utilised in the 2001 National Sentinel Clinical Audit (RCP 2001).

1.4 Cost implications of medication and the elderly

Given the large numbers of medicines prescribed for older people, and the increasing focus on limited resources, the balance between cost and effectiveness has become an important issue (Drummond *et al.* 1990). Walley and Haycox (1997) suggest that the focus on drug expenditure stems not only from the size of the drugs bill, but also from the highly visible nature of drug utilisation and the perception that the drug budget could be used to better advantage. It may also be perceived that this is an area where saving could be made without detriment to patient care. Prescribing indicators were introduced in the United Kingdom over twenty years ago (Ashworth *et al.* 2000). More recently the primary focus has been on drug costs, with a number of initiatives to reduce expenditure (Majeed 1997, Ashworth *et al.* 2002). Fundholding general practices could retain any savings, regardless of the quality of those savings as measured against set indicators.

In Ireland, in addition, moves towards having limited formularies (Weedle and Postern 1985), generic prescribing (O'Grady and Weedle 1998), reviewing costs (McGowan *et al.* 2001), and the introduction of nurse prescribing could be cited as examples of good resource management. There is some evidence that nurse practitioners in the United Kingdom can provide equivalent care to medical staff, and could be more cost effective (Horrocks *et al.* 2002, Venning *et al.* 2000).

The two main factors contributing to the increased expenditure on medicines include "product mix" the prescribing of new and more expensive medication and "volume effect" comprising growth in the number of prescription items and in the number of tablets per prescription (Barry 2002). Ineffective medication management had financial implications in terms of unnecessary treatment episodes both in primary and in secondary care (Rycroft-Malone *et al.* 2000).

However, there are special costs considerations for older people associated with poor prescribing: these are of special importance for people in long-stay care, who are already receiving more medicines than their counterparts living in the community (Clarke and Bowling 1989, Koopmans *et al.* 2003). Inappropriate prescribing can lead to decreased levels of physical and psychological function. Drug-related morbidity and mortality has been identified as a serious economic problem (Bootman *et al.* 1997). O'Grady and Weedle calculated the cost of medicines for elderly residents in an Irish nursing home, including PRN drugs, in 1998 was 60 pence per day and IR£220.35 (Irish punts) *per annum*. The average cost per patient per day was 62.5 pence with a range from 1.5 pence to £71. This compared to a cost of 76 pence per day on admission for elderly patients admitted to a geriatric unit in a general hospital in Cork and 53 pence on discharge (Reardon and Twomey, 1996), a 30% reduction in costs.

Dependency studies have estimated the nursing time spent in the administration of medicines at 11.5 minutes per elderly resident in a 24-hour period (Cheltenham and District Health Authority 1983), which represents a significant cost of staff time.

Recent increases in drug expenditure are primarily due to the availability of more and better drug therapy rather than price inflation (Levy 2002). He suggests that rapidly growing scientific knowledge may be expected to result in major advances in drug therapy in preventing, treating and perhaps even curing many of the costly, life-threatening and disabling diseases affecting older people.

1.5 Medication errors

A report published by the Department of Health in January 2004 entitled *Building a safer NHS for patients: Improving Medication Safety* (DoH 2004), outlines a comprehensive approach to making drug treatment as safe as possible. It builds on the previous report *An Organisation with a Memory* (DoH 2000), which set out an agenda for improving care by identifying and learning from adverse events.

The 2004 report recognises that side effects and adverse reactions are accepted risks of treatment, which should be minimised by careful prescribing and use. However, despite acknowledging that medication error occurs in all health care systems, it states that they occur too frequently and are preventable.

"In contrast, medication error - mistakes, slips or lapses made when medicines are prescribed, dispensed or used – are always avoidable"

The report gave the total error rate for oral drug administration as approximately 5% of doses administered. Although the majority of these are not harmful, as the figures include both delayed and missed doses.

Medication errors include any error in the prescribing, dispensing and administration of a drug whether there are consequences or not, although there has been some debate about exactly what constitutes a prescribing error (Dean, Barber and Schachter, 2000). Rigby and Litt (2000) differentiated between errors and adverse reactions or side effects, the

latter being unavoidable or unpredictable events that occur during the appropriate application of best practice.

There are many contributing factors to medication error, with the cause of the error being more likely to have many contributing factors. Those factors relating to the nursing staff administering medications include illegibility of prescriptions, lack of knowledge of the drug being administered (Alberti 2002) and not challenging unusual doses. Numbers of illegible prescription in an Irish hospital were recently found to be as high as 5.2%% (Cunney, Williams and Feely, 2003). It is also suggested that a low nurse to patient ratio, or the increased use of agency nurses, may result in drug error because it is difficult for nurses to know the patients to whom they will administer drugs (DoH 2004).

Greengold *et al.* (2003) reported on their randomised controlled trial on the impact of dedicated medication nurses on the medication administration error rate. The use of dedicated medication nurses did not reduce the level of error, reinforcing the concept that medication errors are usually related to systems design issues.

There is also an association between medication errors and underlying factors including unreasonable workloads, lighting levels, poor skills, haste, prescription workload and distractions and interruptions (Dunea 1998). Thus, the comparatively long duration of the drug administration round in long-stay residential care, due to the large numbers of medications prescribed, coupled with generally low staffing levels and high level of resident dependency, could leave these units particularly vulnerable to medication error.

Building a safer NHS for patients: Improving Medication Safety identifies key steps for safer prescribing including active management and review of long-term repeat prescribing (Mayor, BMJ 2004). Such reviews might lead to the shortening of the duration and complexity of the drug administration round and reduce the risk of medication error in long-stay residential care.

Misner (2002) suggested that the role of the pharmacist is pivotal in reducing drug errors. However, Delaney (2002) suggested that the variability of time spent by pharmacists might be between 20-80%, in Ireland it will be at the lower end, as some pharmacists spend no time on clinical activities as they work single-handed. It has also been suggested that systems for auditing medication errors might identify a surrogate target condition for study, such as falls and mishaps, which would be appropriate for the residents in the long-stay facilities (Leape 2000).

1.6 The role of the nurse in medicines management

Worthington (2003) argued that nurses in all settings are crucial to the delivery of medicines management. The term medicines management encompasses strategies to enable patients to get the best from their medicines. She referred to the special relationship that nurses develop with patients, which means that they have the potential to be major partners in care. She concluded that:

"the capacity for nurses to create improvement in the management of medicines cannot be underestimated."

In their review of polypharmacy and elderly patients, Larsen and Hoot (1999) concluded that as medical interactions increase substantially with the number of medications taken, the most pertinent nursing intervention is accurate assessment of the patient.

In their discussion of different aspects of medicines management in care homes for older people, Cowan *et al.* (2002) and described the key role of nurses in attenuating some of these problems, while enhancing the quality of life of older people. In his review of the principle of good practice with medicines and the older person, Peate (2003) also concludes that nurses are in an ideal position to ensure that medicines are prescribed and used effectively.

Medication for Older People (Royal College of Physicians of London, 1997) reported that some health authorities have attempted to make nursing home staff responsible for the review of medication, a responsibility that is usually held by general practitioners. In their study of nurse-physician communication and the quality of drug use in a sample of 36 Swedish nursing homes without on-site physicians Schmidt and Svarstad (2002) found that the perceived quality of nurse communication with physicians varied significantly, and was a significant factor of the quality of drug use. They recommended that nurses' perceptions were a good starting point for research in this area.

In their study to determine inappropriate prescribing in elderly Medicaid beneficiaries in Louisiana, Gupta *et al.* (1996) acknowledged that there are many factors, which contribute to prescribing of inappropriate drugs in nursing homes, including the contribution of nursing staff decisions regarding drug prescribing and utilisation. They also pointed out that training programmes for health care professionals generally do not include formal training or experience in long-term care.

In considering principles of good practice, Peate (2000) suggested that nurses could ensure that appropriate prescribing for older people takes place, and can monitor the patient's condition and the effects that the prescribed medications are having. Regular review of prescriptions is recommended to improve the quality and effectiveness of prescribing. Hainsworth (2004) also suggested that nurses have an important role to play in improving medication safety.

In Australia, Pincombe *et al.* (1996) undertook a study of critical aspects of nursing in aged and extended care found that nurses were frequently faced with having to listen to clinical signs from the residents indicating need, comfort or distress, not presuming a basic ease of communication that is frequently absent or severely compromised in the extended care setting.

"When [nurses] know someone well they will often be able to pick up those things early....The experienced nurse has an internal radar and they can pick up on those subtle signs."

At least four reasons are outlined by the American team Jencks and Clauser (1991) in their proposal that a change in clinical practice is needed, including the suggestion that nursing home staff may induce inappropriate prescribing, by asking physicians to control resident behaviour such as wandering, combativeness, and the pulling out of intravenous and feeding tubes. Garner and Evans (2002) suggested that nurses may lodge their feelings of helplessness in long-stay settings with the prescribing doctor who is made to feel that something must be done. Thus, a prescription may be written rather than staff developing imaginative psychosocial or behavioural ways of managing troubled or troublesome residents. Sindhu (1996) also concluded that there is an expectation that a visit from the doctor will result in a prescription being issued, whereas some conditions might respond to either a nursing or other non-pharmacological intervention. The NMIC (2000) reported that senior nursing staff were often the primary source of the opinion that a patient needs a drug.

In her analysis of decision-making in the treatment of acute illness in nursing homes, Kayser-Jones (1995) found that if the nurse does not accurately assess the residents, the physician lacks the data necessary to diagnose and treat them properly. This included meticulous and constant monitoring of residents' condition and alertness to changes (Redfern and Norman 1999) and passing on of relevant information. In a study of nurse-led units in north London, Bernhaut and Mackay (2002) reported that general practitioners were confident of the nurses' ability to assess patients accurately and contact them when appropriate.

A survey of nurses' knowledge and experiences of pain in elderly patients by Closs (1996) found that their awareness of the prevalence of chronic pain and its negative consequences was good. This included a range of less obvious consequences of chronic pain such as malnutrition, cognitive dysfunction, polypharmacy, gait disturbances and falls. A wide range of complementary medicines had been used by many of the nurses, and considerable interest was expressed in developing these skills further.

Stein *et al.* (2001) undertook a randomized controlled study in ten Tennessee nursing homes to review the intervention of an education programme for nursing staff related to the use of non-steroidal anti-inflammatory drugs (NSAIDs). NSAIDs are one of the most frequently prescribed medications in older people, have serious adverse effects, particularly gastrointestinal bleeds. The education intervention described by Stein *et al.*

was a thirty-minute structured training session for nursing staff, which focused on alternative approaches to oral drug therapy in the clinical management of osteoporosis. Treatments advocated included joint protection, exercises, application of heat and cold and the use of topical analgesic preparations. Physicians also received a brief, individual educational message including the benefit and risk of NSAIDs. They found that the intervention was effective, having resulted in markedly decreased use of steroids, (70%) without any decline in overall pain control for the residents.

1.6.1 The changing role of the nurse and nurse prescribing

In light of the most recent national health strategy (DoHC, 2001) and a tightening fiscal policy there is a requirement for a more innovative use of existing resources. A recent report entitled *Nurses and Midwives Understanding and Experiences of Empowerment in Ireland* (DoHC, 2003) reported that nurses should be facilitated to play a critical role in the development of services by improving their education, skills, knowledge and self-confidence. Other nursing developments, which have involved nursing staff in continuously auditing the standards of care, have resulted in more efficient use of resources (Flint and Sinclair 1996).

Nurses in the United Kingdom have been able to prescribe medicines from a limited formulary since 1994. The Crown report (1989) found that the significance of this was not the number of nurses affected, as the number was relatively small compared with the

whole nursing workforce, but the fact that it overturned traditional professional boundaries whereby doctors prescribed, pharmacists dispensed and nurses administered. The Commission on Nursing (1998) recommended the expansion of the role of the nurse in Ireland, which will include the introduction of nurse prescribing.

In their study of a primary care group in the UK, Brooks *et al.* (2001) suggested that nurse prescribing could be seen as one of the most significant changes to take place in nursing as a response to patient need. Luker *et al.* (1997b) evaluated nurse prescribing and reported that saving time for general practitioners, as well as patients, was of benefit. Further, nurses could prescribe items more quickly meaning treatment could be initiated sooner.

1.6.2 Guidelines for the administration of medicines in services for older people

Health care professionals use policies and protocols in various ways to guide their clinical activity and to promote quality patient care (Manias and Street 2000). They suggest, however, that it is important that doctors and nurses establish a fine balance between using policies and protocols to provide directions for practice, and allowing sufficient latitude and flexibility for the practitioners in using clinical judgement. Guidelines are produced in order to reduce inappropriate variations in practice, and to help staff make informed decisions (Thomas *et al.* 1999). Eccles *et al.* (2000) assert that guidelines should assist in closing the gap between what clinicians do and what

scientific evidence supports and they may also be used as a mechanism for quality assurance and clinical audit. The introduction of audit into nursing homes is associated with improvements in the standards of care (Chambers, Knight and Campbell, 1996).

In her seminal work *From Novice to Expert* Benner (Benner 1984, Benner *et al.* 1996) suggested that nursing staff may have difficulty articulating their concerns, despite having expert knowledge, and may use guidelines to provide a baseline to initiate meaningful communication with the medical officer. Manias and Street (2000) suggested that guidelines may be used to assert power and demonstrate resistance about 'undesirable' medical conditions.

The Royal Pharmaceutical Society of Great Britain recently published guidelines for *The Administration and Control of Medicines in Care Homes and Children's Services* (RPS 2003), which supersede their previous publications. These guidelines were designed to assist in the safe handling of medicines and to meet the medication standards that now form an integral part of the process to regulate standards of care. They clearly state the need for clear written procedures for the safe and administration of medicines and the importance of staff education on this subject.

Peate (2003) suggested that the onus is on nurses to ensure that a multidisciplinary approach is adopted when setting standards and developing protocols for the safe and effective administration of medicines.

In their systematic review of theoretic concepts, practical experience and research evidence Davis and Taylor-Vaisey (1997) outlined the steps to be undertaken in the adoption of clinical practice guidelines. First a local group decides to develop guidelines in a clinical area where there is a demonstrated need for such guidelines. Second, data are synthesized from research information and relevant practice patterns by searching the literature, including existing guidelines. This information is then reviewed and collated into a document. The sponsoring organisation then endorses the guidelines document. The guidelines are then disseminated to relevant personnel, usually by post and various strategies are utilised to encourage the health care practitioners to adhere to the guidelines in their clinical practice. After an agreed interval, the guidelines are subjected to reappraisal and appropriate review.

Davis and Taylor-Vaisey concluded that the weaknesses in the process were associated with poor quality of guidelines and the dissemination strategies. Feedback was considered an important component as well as giving reminders and academic input.

There is little evidence in Ireland about changing patterns of nursing care (Flint 2000) in what has been a fairly formal and hierarchical profession to date. There are different ways to go about introducing change, some of which are more successful than others: unfortunately the power-coercive model is commonly used, where senior staff impose changes on staff working in the clinical areas. The rational-empirical model seeks to persuade people that change would be beneficial. In his examination of strategies that can be used to produce change in nursing, Wright (1996) recommends the normative-re-

educative approach, which has significant differences to both of these models. There are key elements for success:

- The provision of ongoing education and development opportunities for staff, access to literature and many other learning opportunities;
- Managerial and organisational support that produces a climate for change;
- Provision of resources such as funding, equipment, time off for staff for change;
- Starting off with pilot sites where staff are willing to participate;
- The presence of a knowledgeable clinical leader, with knowledge of change and expertise in practice, who facilitates by developing staff, building a shared vision of the future, giving support and encouraging both dialogue and participation.

The key themes from this approach were incorporated into the present study design.

1.7 Categorising medication: about the Anatomical Therapeutic Classification (ATC) system

In order to measure drug use it is essential to have a classification system. (McGavock, 2000) The ATC classification system has been in use since the early nineteen seventies in Norway for presenting and comparing drug consumption. In 1981, the WHO Regional Office for Europe recommended the ATC/defined daily dose (DDD) system for international drug utilisation studies (Ronning, 2000).

Using this classification system, drugs are first divided into different groups, according to the organ or system on which they act, then their pharmacological and therapeutic properties, and finally their approved chemical names.

New codes are assigned twice a year by the WHO International Working Group for Drug Statistics Methodology, and alterations are made at the same time. Suggestions for alterations may be forwarded to the WHO centre, with the reason for the proposed alteration and relevant background. An updated version of the ATC index is published in January each year.

1.7.1 Considerations in adopting the ATC system

All international standards demand compromises, and a drug classification system is no exception to this. A medicinal product can be given more than one ATC code if it is available in two or more strength or formulations with clearly different therapeutic uses. Drugs may be used for two or more equally important indications, and the main therapeutic use of a drug may differ from one country to another.

Since ATC codes are assigned at the product level by a national centre in each country, there will nearly always be medicines and combination products for which no ATC codes exist. Sometimes they may be a little confusing, e.g. anti-diabetic therapies (codeA10) are classified under ATC class A, i.e., alimentary tract drug. The main purpose of the ATC system is as a standardised tool for presenting drug utilisation statistics with the aim of improving drug use.

Table 1.6 ATC codes

The medicines are sorted into groups in the following categories:

A – Alimentary system

B - Blood and blood forming products

C – Cardiovascular system

D – Dermatologicals

G – Genito urinary system and sex hormones

H – Systemic hormone preparations, excluding sex hormones

J – General antiinfectives for systemic use

L – Antineoplastic and immunomodulating agents

M – Musculo-skeletal system

N – Nervous system

P – Antiparasitic products, insecticides and repellents

R – Respiratory system

S – Sensory organs

V - Various

Using an internationally recognised system such as the ATC classification allows researchers to make direct comparisons with other research findings where the ATC classification has been used to code groups of drugs. On this basis, the ATC classification system was incorporated into the research design.

1.8 Background to measuring health using ratings scales

The debate on how to measure health is both complex and abstract. McDowell and Newell (1996) described a continuum, with a shift away from viewing health in terms of survival, then freedom of disease, to an emphasis on the individuals' ability to perform daily activities, then to an emphasis on emotional well being and quality of life.

Against a background of growing awareness of the range of measures available, they differentiated between rating scales and questionnaires. Ratings scales involve an expert assessing defined aspects of health, which may vary from rater to rater, while questionnaires use trained interviewers to ask fixed questions. They suggested that asking questions of individuals provides a more direct reflection of health status, rather than using other accepted measures of provision of care i.e. length of stay.

In 1992, The Royal College of Physicians of London and The British Geriatric Society first published *Standardised Assessment Scales For Elderly People* (RCP 1992b). They proposed that the available assessment scales should be reviewed, using the criteria of validity, sensitivity and specificity, reliability, responsiveness to change and format and language.

1.8.1 Assessment of physical function in older people

Functional disability scales measure physical rather than mental status. These typically focus on ADL rating scales, developed by Katz *et al.* (1976), one of the few frameworks that gave a theoretical background. They found that in several illnesses, people tended to lose functions in a given order, and to regain them in the reverse order on recovery from illness (Blackwell *et al.* 1992). They suggested that these ADL scales are concerned with more severe levels of disability, and are therefore mainly relevant in institutionalised and elderly people.

As part of their comprehensive review, the RCP working groups considered eight different measures of primary ADLs. These were the Barthel Index of ADL, the Katz Index of ADL, the Kenny ADL Scale, the Lambeth Screening Questionnaire, the Northwick Park ADL Scale, the Physical Self-maintenance Scale, the PULSES profile and the Rankin Scale. The conclusion was that the Barthel ADL Index (BAI) in its modified form should be recommended for all routine assessment of primary ADLs.

1.8.2 The Barthel Index

The Barthel Index (Mahoney and Barthel, 1965) includes all of the activities usually considered relevant for routine assessment of primary ADL (RCP 1992). The simple scoring system deliberately leaves gaps between the numerical codes to better represent the presumed distance between categories (Mahoney *et al.* 1958). The Barthel score uses

the best available evidence, usually by asking the resident themselves and the nursing staff.

The assessment using the Barthel Index distinguishes between performance (what a person does do) and capacity (what they can do). However, this makes it difficult to determine whether something that a person did not do was due to health reasons, or whether it may be due to the patterns of care in institutions, such as a resident being kept in bed.

Based on its widespread use and well-established validity and reliability (Collin, Wade, Davies et al, 1988), the Barthel Index, as adapted by Shah (Shah 1989), was selected to assess the resident activities of daily living in this study.

1.8.3 Assessment of cognitive function

Measures of mental status and cognitive function are important factors in assessing the older persons capacity for independent living. Cognitive problems form a spectrum, ranging from mild decline, to the extreme incapacity of dementia found in many residents in long-stay institutions (RCP 1998). The RCP guidelines (1998) suggested that comprehensive clinical assessment, and the identification and diagnosis of cognitive impairment, means that problems which may present with similar signs and symptoms to a dementia syndrome, such as acute confusional state, delirium or clinical depression

may be excluded. The older person should then receive the appropriate treatment for their clinical condition.

1.8.4 The Mini-Mental State Examination (MMSE)

Mental status ratings originated as bedside ratings, and have been adapted as screening tools. Folstein *et al.* (1973) first described the "Mini-Mental State" in 1973. At that time, standard examinations used in psychiatric patients were lengthy, which meant that older people found it hard to concentrate for long periods. Folstein devised the Mini-Mental State Examination with only 11 questions, which took 5-10 minutes. It was described as "mini" because it only included cognitive aspects of mental function. It is therefore utilised to assess cognitive function only, with other specific tools recommended for the diagnosis of dementia and depression in older people (RCP 1998).

The Folstein Mini-Mental State Examination has been adapted for Irish use, and is an established tool for the rapid assessment of cognitive function in the Irish setting (O'Neill *et al.* 1988, O'Neill *et al.* 1989).

Another advantage of the MMSE is that interviewers other than medical staff can be trained to use the questionnaire.

1.9 Formation of hypothesis of the thesis

The current study has identified the recurrent theme of medicines management in institutionalised older patients as an important subject that would benefit from critical review.

This led to the following three hypotheses:

1. That a quality improvement programme, generated by the nursing staff, could improve the quality of prescribing in institutionalised older people

2. That the introduction of guidelines for the administration of medicines, in tandem with an educational programme, could have an effect on prescribing patterns and the economics of prescribing in the long-term institutions

3. That the levels of residents' physical dependency and cognitive function may be related to prescribing patterns

The following aims for the study were therefore developed:

1. *To compare prescribing practices between the four long-stay institutions for older people.*

2. *To introduce guidelines for the administration of medicines, in tandem with an educational programme for nursing staff.*

3. *To compare prescribing practices following this intervention, with particular reference to those drugs that have been identified as having implications for the quality of life for older people.*

4. *To compare medication costs before and after the intervention.*

5. *To compare prescribing patterns among the elderly residents in long-term care institutions with a similar cohort of older people, matched by gender and age, and resident in the community.*

CHAPTER TWO:

PATIENTS, MATERIALS AND METHODS

Patients, materials and methods

2.1. Research setting

All units for older people in the Eastern Region Health Authority (ERHA) region classified under the heading of 'geriatric hospitals and homes' were identified.

Exclusion criteria were:

- New, smaller, built for purpose 'community units' with fifty beds or less, which had been based on a newer models advocated in *The Years Ahead* (1988), and provide a broader range of services.

- Units with student rotations. These are subject to regular review and audit process by An Bord Altranais, and have established standards of care.

- Units with any regular medical cover other than an arrangement with local general practitioners.

A simple random selection was used to identify five units in the region. Although all five units participated in the preparatory stages of the pilot project, one hospital withdrew before the research project commenced due to change in management. The four geriatric

hospitals included in the research project are designated Site A, Site B, Site C and Site D. All the hospitals were situated in rural areas; their catchment areas include both urban and rural areas in County Wicklow and County Kildare.

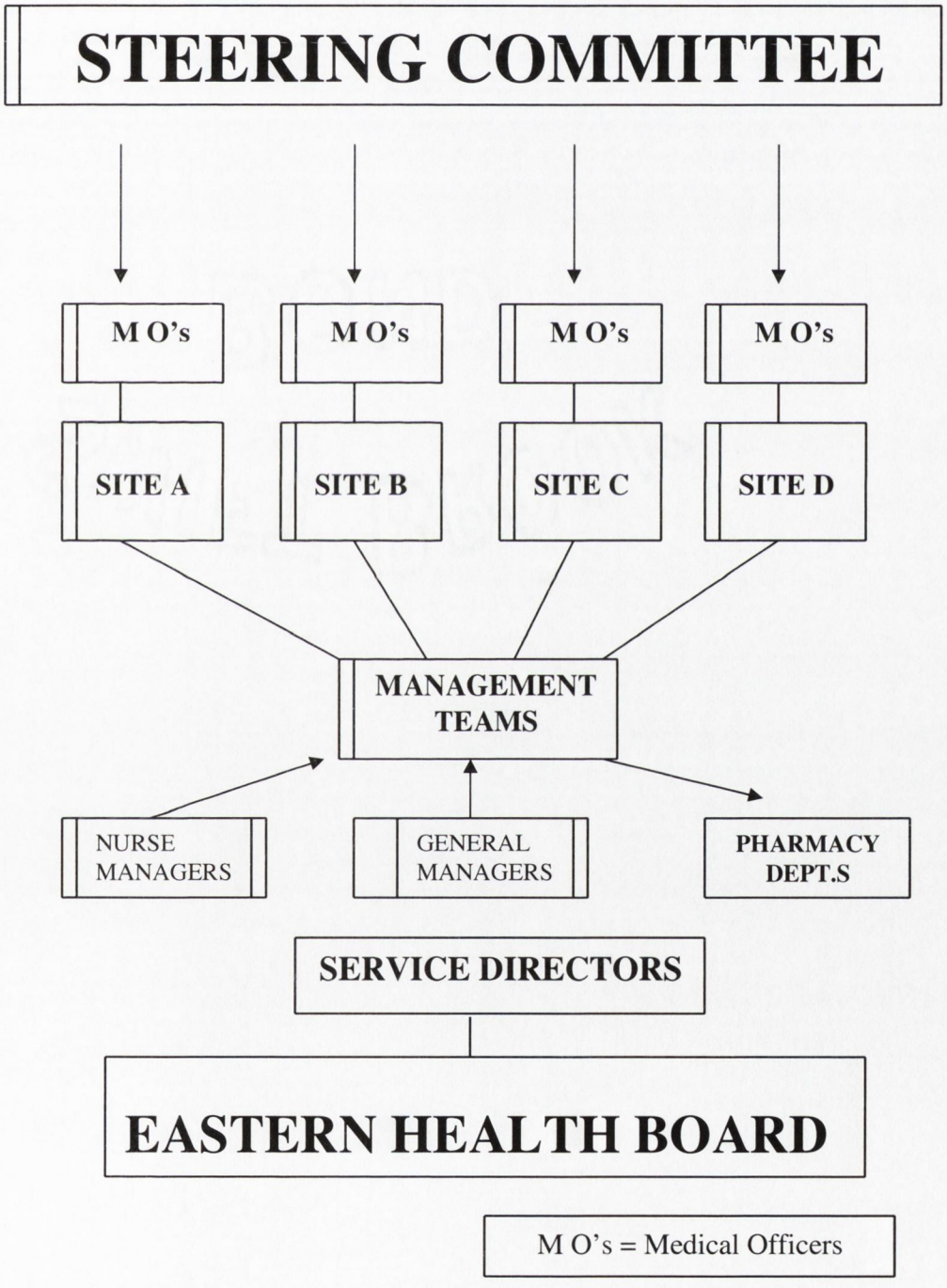
The sample included all residents on all wards in all four hospitals. (n=560) All wards were included as residents are often transferred between wards, either because of their clinical condition, for safety reasons or to even out the nursing workload.

The staff sample for the intervention included all registered nurses. (n=225) All nursing staff were included because the geriatric homes/hospitals have a relatively small number of staff, and nurses rotate between wards, sometimes on a daily basis.

2.1.1 Study design

Since the research hypotheses identified staff involvement as pivotal, an action research model was used. McKenna (1993) has suggested that the main advantage of action research is that, through participant involvement in the change, the successful implementation of an innovation is encouraged. The project was sanctioned at a meeting of the former Eastern Health Board, now the ERHA, as an integral part of the plan for the introduction of clinical audit and quality improvement. This quality assurance project and audit process remains on going. The following chart clarifies the steps taken by the researcher to communicate with the staff about the quality assurance project.

FACILITATION PATHWAY



M O's = Medical Officers

2.2 Development of the research hypothesis: The Pilot Study. *Introducing the audit process to long-stay services for older people in the Eastern Region*

As part of a quality assurance or continuous quality improvement programme, different guidelines and audit measures were introduced for the assessment of standards in the 4 long-term care institutions. These included the following measures:

1. Nursing staff interviews
2. Comprehensive audits of both clinical and non-clinical services using the computerised audit system "QASAR"
3. Collections of key markers of quality of long-term care
4. Observational study
5. General information from informal discussion

It was intended to use the results to generate the first subject to be reviewed.

2.2.1 Nursing staff interviews

As has been stated, nursing staff not only constitute the largest resource in the health service, but in geriatric homes/hospitals they function as a single-handed profession for most of the working day. Therefore, in an attempt to identify important areas that should

be addressed to improve the quality of care, it was decided to collect some initial information by interviews.

A qualified nurse, who did not work for the health board, used an unstructured rather than structured approach. It is important that the person undertaking interviews has an understanding of the language and culture of respondents. Unstructured interviewing was selected as it provides a greater breadth than other types; the general topics to be explored are agreed, but the interviewer does not use closed-ended questions or a formal approach to interviewing. The project teams agreed the profile for the unstructured interviews.

Convenience samples of both day and night staff were identified in all the hospitals (n=88). All nurses on duty were invited to attend for an informal interview to discuss quality of care. Results were analysed for common themes using a computer software package NUD.IST that is designed to aid users in handling non-numerical data in quantitative analysis (NUD.IST 1993). The results were subsequently analysed by the researcher (HF) using immersion techniques, in order to identify common themes. Immersion, also known as crystallisation, is recommended in qualitative research when the goal is exploration, and the use of interviews argue for a style that is unstructured and fosters intimate contact with the text. (Miller and Crabtree, 1994)

2.2.2 Comprehensive audits of both clinical and non-clinical services using a computerised audit system "QASAR"

Nursing staff in Ireland have been using manual systems of quality assurance since the 1980's. The most commonly used system was "Monitor" which is regarded as a well-validated tool (Redfern and Norman, 1999, Tomalin, 1993). This has been reviewed and refined as "Senior Monitor". This audit system is now available as a computerised system known as "QASAR".

The QASAR system is comprehensive, and collects information about both clinical and non-clinical aspects of care. The questions can be adapted to suit the environment in which the audit takes place. Standard letters were distributed to residents and their families as appropriate, explaining the purpose of the audit. Information about the audit was circulated widely around the units. Additional quality issues were added to the standard format. Information was gathered from observation, from discussion with residents and staff, and documentation was examined. The responses were swiped into a bar code reader (similar to those used in supermarkets) and after every seven audits, the result were downloaded into a computer. Results were then printed out for each ward.

2.2.3 Key markers of quality of long-term care

In 1992 the Royal College of Physicians (RCP) in its report *High Quality Long-Term Care for Elderly People* described guidelines and audit measures for the management of common challenges encountered in long-term care. The report identified eight 'key indicators' for quality in long-term care for older people (RCP 1992a). The eight key indicators included adverse events, and were believed to reflect quality of life. These were further expanded and updated in the document *Enhancing the Health of Older People in Long-Term Care* in 1998 (RCP, 1998).

Four indicators were selected based on the feedback from the interviews and the audit results to date, namely promoting continence, optimising drug use, managing falls and accidents and preventing pressure sores. In addition, information was collected on the levels of resident dependency.

Forms were designed to collect information from each ward on a monthly basis. The information was quantitative for indicators such as incidence and prevalence of pressure sores and their classification.

The returns for 'optimising drug use' collected information about the use of specific medication, i.e., medication affecting the central nervous system.

2.2.4 Observational study

The approach in which a researcher goes to a social situation and gathers material about the social world is known as naturalistic observation. One of the characteristics of observation has traditionally been its non-intervention. This means that observers must not seek to influence surroundings, processes or outcomes, but follow the flow of events. It is hoped that, by using simple observation, behaviour and interaction will continue as they would without the presence of a researcher, and will be uninterrupted by intrusion (Adler and Adler, 1994).

It was deemed important to include some observations in the quality assurance process:

* The nursing staff felt that, despite the audit process, it was difficult to quantify some of the day-to-day problems encountered in the geriatric hospitals in clinical practice

* It would help to contextualise issues that they had raised in the quality assurance project to date

* There would be a common understanding of the environment in which the residents live

It was agreed that the researcher would spend some time working alongside staff in each geriatric hospital in the capacity of a registered nurse. This included working full shifts

and taking a resident caseload. There would be no interference or comment regarding current clinical practices unless a situation was deemed to be unsafe.

A confidential report was dictated at the end of each shift. A final report raising general themes, rather than individual issues, was submitted to each site.

2.2.5 General information from informal discussion

There was also discussion with other staff members about the quality assurance project, particularly in relation to the administration of medicines. Visits were made to the general practitioners and pharmacists, and meetings were held with the Chief Pharmacist for the Health Board, Directors of Nursing, Hospital Managers and Directors of Services for Older People.

2.3 Data collection procedure

The fieldwork took eighteen months to complete. A quasi-experimental or before and after design was used (Flint, 1996). The data collection process took place in October 2000 (pre-intervention), and was repeated in April 2002 (post-intervention).

The following data was collected:

1. All resident drug prescription charts were photocopied.
2. All resident were assessed with the assistance of a second person, namely a registered nurse familiar with the resident, using the Barthel Score.
3. The Mini-Mental State Examination score was collected for each resident.
4. The time taken to complete each drug round during a twenty-four hour period was recorded.
5. Staff/resident ratios were calculated retrospectively.

2.3.1 Photocopying drug charts

When collecting information from charts in large hospitals, a photocopier is usually taken to the ward, and the prescription charts are photocopied in situ as they become available. The 4 long-stay units only had one photocopying machine located in the central general office. It was necessary to book time on the machine during office hours. Batches of

charts were retrieved from the wards throughout the day at agreed times, so that they were available in the clinical area for both drug administration rounds and general practitioner's visits.

2.3.2 Recording Barthel Index

This system of assessing residents was not in use in any of the 4 units at that time, so information could not be collected from the residents' medical records or over the telephone, both of which would otherwise have been acceptable practice.

Appointment times were arranged at the convenience of each ward team, to take account of other commitments such as ward handovers and meetings, staff training, religious services and resident social activities. The researcher in tandem with the nursing staff completed the Barthel Index.

The Barthel Index gives a weighting score for each ADL, which reflects the relative importance of each type of disability in terms of nursing care needed and social acceptability. Adding up the scores on each rating forms an overall score, and the result suggests the time and assistance a person will require. The Barthel Index usually takes between 2-5 minutes to complete, where the member of staff is familiar with the residents being assessed.

Table 2.1 The Barthel Index (Mahoney and Barthel 1965)

	Function	With help	Independent
1	*Feeding (if food needs to be cut up = help)*	5	10
2	*Moving from bed to chair and return (including sitting up in bed)*	5-10	15
3	*Personal toilet (wash face, comb hair, shave, clean teeth)*	0	5
4	*Getting on and off the toilet (handling clothes, wipe, flush)*	5	10
5	*Bathing self (or if unable to walk propelling wheelchair)*	0	5
6	*Walking on level surface*	10	15
7	*Ascend and descend stairs*	5	10
8	*Dressing (includes tying shoes, fastening fasteners)*	5	10
9	*Controlling bowels*	5	10
10	*Controlling bladder*	5	10

The higher the score, the more independent the individual.

Table 2.2. Suggested interpretations of the Barthel Index (Shah *et al.* 1989)

BARTHEL SCORE	LEVEL OF DEPENDENCE
(1.) 0-20	*Total dependency*
(2.) 21-60	*Severe dependency*
(3.) 61-90	*Moderate dependency*
(4.) 91-99	*Slight dependency*

This system of recording was sometimes problematic, because the nursing staff were not always available to find time to assist in the assessment, usually due to staff shortages or other unforeseen circumstances. Sometimes the staff on duty were agency or bank staff, who did not know the residents. In these cases, further visits to the wards were made in the evenings and at weekends.

2.3.3 Recording the MMSE

As in the case of the Barthel Index, a current MMSE score was unavailable in the nursing or medical notes. It was therefore necessary to assess these residents in tandem with those nursing staff that had been trained in the use of this questionnaire as part of the programme.

The MMSE provides a reasonably rapid assessment of cognitive function in the following domains; orientation (10 questions), memory sub-divided into registration (three questions) and recall (three questions) calculation (five questions), and simple language and parietal functions (seven questions). All questions are asked in the order listed and may be scored immediately by adding the points assigned to each successfully completed task.

Table 2.3 Mini Mental State Examination (Adapted, O'Neill *et al.* 1988)

1.	**ORIENTATION (maximum score 10)**	
	What is today's date?	*1*
	Can you also tell me what day of the week it is?	*1*
	And the month?	*1*
	And the year?	*1*
	What date does St. Patrick's day fall on?	*1*
	What town (or city) are we in?	*1*
	Name two main streets nearby.	*1*
	What is this address?	*1*
	Who is the Taoiseach?	*1*
	Who is the president of Ireland?	*1*
2.	**REGISTRATION (maximum score 3)**	
	I now would like to test your memory	
	(Name 3 common objects: e.g. "ball, flag, tree")	
	Can you repeat the words that I have said	
	"ball"	*1*
	"flag"	*1*
	"tree"	*1*
3.	**ATTENTION AND CALCULATION (maximum score 5)**	
	Beginning at 100 can you serially subtract 7 giving me the answer each time?	
	"93"	*1*
	"86"	*1*
	"79"	*1*
	"72"	*1*
	"65"	*1*
4.	**RECALL (maximum score 3)**	
	What were the 3 words I asked you to repeat earlier?	
	"ball"	*1*
	"flag"	*1*
	"tree"	*1*
5.	**LANGUAGE AND PARIETAL SKILLS (max. score 9)**	
	Show the patient a wrist watch and ask "what is this?"	*1*
	Repeat for pencil	*1*
	Ask the patient to repeat the sentence "No ifs, ands or buts."	*1*
	Show the patient a card the accompanying card (in pocket) which contains the instruction "Close your eyes" and request the patient to do what it says.	*1*
	Tear off this sheet and use the reverse to ask the patient "Can you write a short sentence for me?	*1*
	Give the patient a piece of paper and say "Take this paper in your right hand, fold it in half and put it on the table."	*1+1+1=3*
	Again, on the reverse of the page ask the patient to copy the drawing that appears there. Copies drawing correctly.	*1*

The MMSE was generally found to be straightforward by the staff although time-consuming. Some residents with auditory or visual impairment, distressed or wandering residents, and terminally ill residents were unable to participate in the assessment.

2.3.4 Calculating the time spent in the administration of medicines

The researcher, as recommended in other nursing workload calculation systems, timed the drug administration rounds. (CCDHA, 1983) This proved problematic because:

- Some staff felt obliged to work at speed to demonstrate efficiency;
- Some took more time than usual to follow good practice;
- Some units had a fixed time to finish the drug round;
- Some units encouraged attendants/relatives to help and some did not.

Finally, the nursing staff also recorded the length of time for each round during twenty-four hours over a two-week period. The researcher also undertook a separate observational study in a unit that had not been included in the study, and where the staff were not familiar with the researcher, in order to validate the method. This long-stay unit was in the ERHA region and therefore had similar resources as the 4 long-stay units in the main study.

2.3.5 Calculating staff/resident ratios

The number of registered nurses in hospitals is based on a fixed staffing establishment, sometimes known as a complement. These are expressed in Whole Time Equivalents (WTEs), which relate to the number of funded full-time posts. In nursing terms that figure is based on a 39-hour working week. This staffing level is reviewed annually with the financial allocations, and the establishment may change if the configuration of a service changes.

In order to calculate the nurse patient ratio, it is necessary to add up the number of nursing hours in each hospital, which includes both full and part-time staff, and express this as their establishment in terms of WTEs. A standard allowance for annual leave, training and sickness (ATLS), usually 18-21%, is then subtracted to give the number of staff hours available. These hours are then divided by the number of residents, multiplied by the hours in the working week and divided by 7 to give the staff /patient ratio. Therefore, the calculation for staff/patient ratio is:

Total no staff (WTE) –ATLS allowance) ÷ no residents (x39÷7) = staff/pt ratio.

2.3.6 Data entry

All data was entered into the spreadsheet by the researcher. This included:

1. *A unique patient identification number*
2. *Site*
3. *Ward*
4. *Gender*
5. *Age*
6. *Barthel score*
7. *MMSE score*
8. *Total no. of drugs prescribed*
9. *Name of medication (see note below)*
10. *Number of times prescribed daily*
11. *Dose*
12. *p.r.n drugs/maximum dose where stated*
13. *formula of drug e.g. suppositories*
14. *The Anatomical Therapeutic Chemical classification (ATC)*
15. *Daily ingredient cost per drug*

The data was entered both pre- and post the intervention.

NB Name of medication. Those prescriptions which were illegible on first analysis were subsequently double checked at the end of each complete ward entry. Assistance was then sought from ward staff where appropriate.

2.3.7 Cost calculations

The total cost of medication was unavailable for each hospital, due to difficulties in accessing current financial statements at that time. Therefore, costs were taken from the current general Medical Services (GMS) database and confirmed with Irish MIMS. Ingredient costs per item were calculated for each individual prescription: the cost per package of medication, such as number of tablets per bottle was calculated, down to a cost per unit such a tablet. The total daily cost per resident was then calculated. Costs of items such as tubes of cream were entered as a unit cost. Injections were calculated by individual vial, assuming the rest of an unused vial was discarded. Inhalers were calculated as being issued on a monthly basis.

The cost of medication prescribed *pro re nata* (PRN) or 'as required' was calculated for the minimum number possible dispensed if the prescriber had not indicated otherwise. It was not feasible to calculate the actual dispensing practice of PRN medicines from the prescription charts in use, as the drugs dispensed varied from day to day, according to both the clinical condition and daily activities of the resident.

The costs in October 2000 were in Irish punts. The costs in April 2002 were in euros. In order to facilitate comparisons they are presented as euros, converted at time of change of currency. The euro: punt calculation was undertaken using the government calculator at time of changeover.

2.3.8 A comparison between the levels and types of drug prescribing in the long-stay units with older people living in the community

The study design was compromised by the lack of suitable controls for the long-stay residents. It was therefore decided to compare the levels and types of drug prescribing in the institutionalised older people with community dwelling older people.

The controls were older patients (>70 years) living in the community (n=2475) who had received a drug prescription during the month of October 2000. Prescribing data on these patients was available from the GMS payments board database of the Eastern Regional Health Authority. Five patients were randomly selected from the database to act as controls for each long-stay hospital resident, matched by gender and age in five-year bands. Ingredient costs were calculated per item per month. Adjustments were made for the following drugs in terms of duration and supply: drugs prescribed once a week: for the p.r.n drugs a maximum duration of 15 days was assumed and the cost was based on that premise (cases were calculated as per individual drug regimen): for creams and ointments the whole tube or jar: monthly and once only injections were calculated by individual vial: inhalers by one per month: drugs taken on alternate days were calculated for 15 days supply.

2.3.9 Statistical methods – long-stay care

The data were extracted from the charts and entered into an Excel spreadsheet. Each resident was allocated an identifying code, and data entered for site, ward, gender, age, name of each drug, numbers of prescriptions per day, dose, a code was entered for prescribing of drugs other than daily or more, total number of prescriptions per resident per day, ATC code. Illegible prescriptions were identified as 'missing' data. These prescriptions were then reviewed again, before assistance was sought from nursing staff on the wards, who were usually more familiar with the prescribers writing.

Costs were calculated using the GMS database and checked with Irish MIMS. The costs were identified per item, e.g., per pill, and then the total daily cost was calculated. Total unit costs were used for discrete items such as tubes of cream, inhalers etc. For analytical purposes the data was imported into the JMP statistical software. (SAS Institute Inc.) For continuous data, which was normally distributed, comparisons between groups were made using t-tests or Analysis of Variance (ANOVA). Where the data were non-normal e.g. for costs, non-parametric tests such as the Wilcoxon rank sum test (for 2 groups) and Kruskall-Wallis (for more than 2 groups) was used. Categorical data were analysed using Chi-square tests. Significance at a 95% confidence interval ($p<0.05$) is assumed.

2.3.10 Statistical methods – cases versus controls

The data collected from prescription charts in the long-stay units and the GMS database were analysed to determine patterns of prescribing using descriptive indicators, assessing the prescription of both beneficial and potentially harmful or unnecessary drugs in the study sample. The number and proportion of the study subjects using different classes of drugs, as defined by the ATC code groupings, were calculated.

Further analysis was performed, using both sets of data, excluding all patients in the long-stay units who were prescribed drugs on an 'as required' or *p.r.n.* basis. Conditional logistic regression analysis was used to determine odds ratios (OR) and 95% confidence intervals (CI) for the different drugs prescribed to the cases compared to controls. The odds ratios were also adjusted for the number of prescription received. Average numbers of prescriptions and costs per prescription per patient per month are also presented with standard deviation (SD). T-tests were used to make comparisons between cases and controls.

All statistical analysis was carried out using SAS Version 8.0 (SAS Institute Inc). Significance at $p<0.05$ is assumed throughout.

2.4 Writing the guidelines for the administration of medicines

The Nursing Board An Bord Altranais (ABA) published guidelines on policy development in 2000 entitled *Guidance to Nurses and Midwives on the Development of Policies, Guidelines and Protocols* (ABA, 2000). These were used as the blueprint for drawing up the new policy document. They offer guidance for the personnel who should be invited to participate in the process, namely:

- *Key stakeholders, defined as representatives of all groups likely to be affected by or implementing the policy, guideline or protocol;*

- *Anyone with special expertise relating to the particular area addressed within the policy, guideline or protocol;*

- *Representatives of nursing management;*

- *The organisation's Legal Advisor if applicable;*

- *The organisation's Risk Manager if applicable.*

2.4.1 Establishing the Steering Committee

A Steering Committee was established with representatives from all four sites. These included a general practitioner, nursing staff from all sites, a senior pharmacist, Director of Nursing and Hospital Manager. The researcher, who also undertook all secretarial support, chaired the Steering Committee. All members of the committee were circulated with relevant documentation including the An Bord Altranais guidelines document prior to the initial meeting. Other experts were invited to attend specific meetings from time to time as appropriate. Minutes of all meetings were sent to all the wards in addition to the committee members.

2.4.2 Consultation for the policy document

All staff were given the opportunity to discuss the draft document at some stage during its development, using the forum of the In-Service Training programme (described later) for the nursing staff. Their comments were recorded by a rapporteur, and synthesised by the researcher for feedback to the Steering Committee. Expert opinion was sought on their comments where appropriate.

The Consultation process included other sources of expertise including:

- World literature
- A range of hospitals that had introduced a similar policy document

- An Bord Altranais guidelines
- Heads of Pharmacy
- Medical Officers
- Consultant Geriatrician
- Department of Pharmacology and Therapeutics, TCD
- National Medicines Information Centre
- Irish Medicines Board
- European Foundation for the Advancement of Healthcare Practitioners/Institute for Safe Medication Practices
- Department of Health and Safety
- Risk Management Consultant
- Irish Nurses Organisation
- Legal advisers to the Health Board

It was agreed that the final decision about any area of controversy would rest with the Department of Pharmacology and Therapeutics at Trinity College Dublin.

The Steering Committee focused on both general matters and those that had been identified in the preparatory stages of the project as problematic, e.g., crushing medicines. General information was also included, such as contact details for the National Poisons Unit and the National Medicines Information Unit.

2.4.3 Distribution of the policy document

Funding was sought from the Department of Health to print sufficient copies for each participant involved in the process to receive their own copy. The document was printed in a pocket-sized version. Nurses were presented with their copy in person by the researcher on the follow-up In-Service study days. The Chairman of the Health Board also launched the policy document.

2.5 Drug Update Programme (In-Service Training)

All nursing staff in each of the four geriatric hospitals were seconded to undertake a two-day Drug Update Programme (Cowal *et al.* 1997). Since there was no funding to cover substitution, each hospital could only release small numbers each time. Therefore a number of different dates and venues were arranged, totalling 26 study days in all. The programme was two full days and a copy of the programme was submitted to An Bord Altranais for scrutiny, in order to obtain An Bord Altranais certification for attendance on both days (ABA 1997). On the advice of the nursing board, a registered tutor was contracted to oversee the study days, and deliver the lectures relating to the use of medicines in care of older people. The Health Board met the tutor's fees and expenses. In addition to the sessions from the registered tutor, pharmacy staff and a Head of Pharmacy, staff from the Irish Medicines Board, Trinity College and the researcher delivered additional lectures.

The programme included topics such as pharmacokinetics and pharmacodynamics, adverse drug reactions, polypharmacy and inappropriate prescribing, an introduction on how to use the BNF and the role of the Irish Medicines Board. (Appendix 2) In addition, a copy of the BNF was purchased for each ward. At the request of the staff attending the course, it was agreed with management to update this copy on a regular basis. During the second day, staff were given the opportunity to review the draft policy document, as

described above, and discuss relevant issues for inclusion, exclusion or amendment (Latter *et al.* 2000).

It was agreed that attendance on the course should be mandatory for all nursing staff who had not attended a similar programme in the last two years, and who were engaged in any aspect of the administration of medicines.

A further series of single study days was arranged in 2002, to give staff feedback on the findings, and update their knowledge in areas of concern that the results had highlighted.

2.6 Data re-collection

In the final phase of the study, after the In-Service Training Programme was completed and all staff had received their copy of the guidelines, post-intervention data was re-collected for comparison.

CHAPTER THREE:

RESULTS

3.1 Characteristics of long-stay residents and their medication use

There was a cohort of 560 residents in October 2000 in the four hospitals included in the study and 557 residents included in April 2002. Data is presented for the residents' gender, age, Barthel Index, and the Adapted Folstein Mini-Mental State Examination (MMSE). All medications on all prescription charts are included in the analysis.

In October 2000, 407 (73%) residents were female and 153 (27%) were male. The median age was 82, range from 46-102 (IQR 76, 87) as presented in Table 3.1. There were a total of 6,139 drug prescriptions. 5,910 were legible and were entered into the spreadsheet. Initially illegible data was <5% but this was further reduced to <0.04%. There were 448 individual drugs relating to 371 different ATC codes. The median number of drugs prescribed per resident was 10: range from 1-27 (IQR 8,14).

In April 2002, 403 (73%) residents were female and 154 (27%) were male. The median age was 81, range from 49-101 (IQR 76,87). There were a total of 6910 drug prescriptions: 6,833 were entered into the spreadsheet. Illegible data was 1.1%. There were 447 individual drugs relating to 365 ATC codes. The median number of drugs prescribed was 12: range from 0-29 (IQR 9,15).

The major difference between 2000 and 2002 was an increase in the median number of drugs from 10 to 12, which was statistically significant ($p<0.0001$).

Table 3.1 Characteristics of long-stay residents and their medication use:

	October 2000	**April 2002**
No. residents	560	557
No. of females	407	403
No. of males	153	154
Median age of patients	82	81
range	46-102	49-101
IQR	76, 87	76, 87
Total no. prescriptions	6139	6910
Total no. preparations	448	447
No. ATC codes	371	365
Median no. drugs per resident	10	12
range	1-27	0-29
IQR	8,14	9,15
Number (%) receiving:		
≤ 1 drug	0.4%	0.2%
2-4 drugs	3.75%	2.9%
≥5 drugs	95.9%	96.9%

N.B. Median number of drugs per resident includes both regular and PRN drugs

3.2 Comparisons of prescriptions between sites

Table 3.2.1 presents the median number of prescriptions for residents by site with all PRN or "as required" medication included in 2000 and 2002. This gives the maximum number of medicines that the residents could possibly receive on that day. The median increase in Site A from 10 to 11 is statistically significant (p=0.0003). There is a slight increase in Site B but it is not statistically significant. Site C has an increase in number of drugs, from median 15 to 16, which is significant (p=0.007). The increase in Site D from 9 to 10.5 is also significant (p=0.0012).

Table 3.2.1 Median number of drugs by site when PRN prescriptions included:

Location	October 2000 median (IQR)	April 2002 median (IQR)	p-value
Site A	10 (8,12)	11 (9,14)	p=0.0003**
Site B	9 (7,12)	10 (7,12)	p=0.2945
Site C	15 (11.75,18)	16 (13,20)	p=0.007*
Site D	9 (7,11)	10.5 (8,14)	p=0.0012*

Table 3.2.2 gives the median numbers of prescriptions excluding PRN medicines. The median number of drugs remains the same over time. There is a small increase in the number of residents receiving ≥5 drugs. The majority of the residents are not receiving any PRN drugs and this has remained the same over time.

Table 3.2.2 Median number of all drugs when PRN prescriptions excluded:

	October 2000	**April 2002**
Median no. drugs per resident	7	7
range	1-17	1-20
IQR	(5,9)	(5,10)
Number (%) receiving: ≥ *1 drug*	2%	2.5%
2-4 drugs	18.2%	14.4%
≥*5 drugs*	79.8%	83%
Total no. residents receiving non PRN drugs only	65.3%	61.4%
Total no. residents receiving PRN drugs	34.7%	38.6%

Table 3.2.3 presents the median number of drugs by site excluding PRN prescriptions. It can be seen that the trend in Site A, Site B and Site D is for the median number of drugs to remain similar, while Site C has a statistically significant increase in the median number of drugs.

Table 3.2.3 Median number of drugs by site when PRN prescriptions excluded:

Location	October 2000 median (IQR)	April 2002 median (IQR)	p-value
Site A	6 (5,8)	7 (5,9)	p=0.332
Site B	8 (6,10)	7 (5,10)	p=0.536
Site C	7 (5,9.25)	9 (7,12)	p<0.0001**
Site D	6 (4,8)	7 (5,9)	p=0.079

3.3 Comparison of medication costs

Table 3.3 presents the median cost of medication for all residents in the study. The data here includes all PRNs. The median cost of medication for all residents has increased between 2000 and 2002 from €9.78 to €11.85. The cost for female residents has increased from €9.82 to €11.75. The cost for male residents has also increased from €9.57 to €11.94. The median costs have decreased over time in Site A from €11.54 in 2000 to €9.40 in 2002, and in Site B from €10.55 in 2000 to €8.25 in 2002. However, the costs have increased in Site C and Site D over time. Site C increased the most, from €11.06 to €18.64 ($p<0.0001$). This is the largest increase of all the sites with a difference of €7.58. Site D has also increased over time from €7.10 in 2000 to €11.87 in 2002, an increase of €4.77 ($p<0.0001$). The range of costs was €0.23 to €73.14 in 2000. The range of costs was larger in 2002, from €0.12 to €189.24.

Table 3.3 Median cost of medication per resident per day in 2000 and 2002:

Cost of medication	October 2000	April 2002	p-value
Total cost (median)	€9.78	€11.85	<0.0001**
Range	0.23-73.14	0.12-189.24	
IQR	(6.27, 15.72)	(6.96,20.57)	
Total cost females (median)	€9.82	€11.75	0.0003**
Range	0.25-73.14	0.22-83.83	
IQR	(3.48, 15.64)	(6.96,19.68)	
Total cost males (median)	€9.57	€11.94	0.0282*
Range	0.23-52.55	0.12-189.24	
IQR	(6.34, 16.46)	(6.73,23.10)	
Site A Median cost	€11.54	€9.40	0.360
Range	0.25-64.58	0.12-172.84	
IQR	(6.76,18.17)	(3.11,10.24)	
Site B Median cost	€10.55	€8.25	0.024
Range	0.23-52.55	0.72-45.77	
IQR	(7.94,19.55)	(5.40,11.74)	
Site C Median cost	€11.06	€18.64	<0.0001**
Range	2.15-55.94	2.87-189.24	
IQR	(6.67,16.57)	(10.62,32.78)	
Site D Median	€7.10	€11.87	<0.0001**
Range	0.81-73.14	0.55-83.83	
IQR	(4.74,10.69)	(6.50,17.27)	

3.4 Comparison of medicines by ATC drug class

Table 3.4.1 presents the breakdown of medication by ATC drug class in 2000 and 2002. The data here includes all PRNs. There is an increase in use of drugs relating to the alimentary tract, which is highly significant ($p<0.001$). There is also an increase in dermatological products and antibacterials from 2000 to 2002. Between 2000 and 2002 there is a decrease in blood forming products, which is highly significant ($p<0.001$), and in the use of central nervous system drugs ($p<0.001$). The use of antipsychotics ($p=0.038$) and hypnotics ($p=0.005$) has also decreased.

Table 3.4.1 Breakdown of drugs by ATC classification:

Drug class	**2000 %**	**2002 %**	**Chi-square, p-value**
Alimentary (A)	20.3	24.4	<0.001**
Blood forming products (B)	7.0	5.09	<0.001**
Cardiovascular (C)	9.9	9.6	0.533
Dermatological (D)	2.4	3.05	0.031*
Antibacterials, vaccines, etc (J)	5.95	6.86	0.050
Musculoskeletal (M)	3.89	3.97	0.830
CNS drugs (N)	37.08	34.1	<0.001**
Respiratory (R)	5.88	5.65	0.563
Anti-psychotics	6.9	6.02	0.038*
Anxiolytics	5.67	5.7	0.868
Hypnotics	6.01	4.9	0.005*
Antidepressants	3.72	3.3	0.158

Table 3.4.2 presents the breakdown of medication by ATC category by the percentage of residents receiving them in 2000 and 2002. There are significantly more residents receiving drugs relating to the alimentary tract ($p<0.001$) and anxiolytics ($p<0.001$) over time. Fewer residents are prescribed blood-forming products over time ($p=0.015$).

Table 3.4.2 Percentage of residents receiving any of the specific class of drug:

Drug class	2000 %	2002 %	Chi-square p-value
Alimentary tract (A)	82.86	92.8	<0.001**
Blood forming products (B)	55.7	48.5	0.015
Cardiovascular (C)	58.04	60.5	0.401
Antibacterials, vaccines etc (J)	48.8	48.5	0.95
CNS drugs	97.9	98.6	0.373
Respiratory (R)	37.7	40.7	0.292
Anti-psychotics	51.6	52.2	0.83
Anxiolytics	47.9	58.2	0.001*
Hypnotics	61.4	58.3	0.294
Antidepressants	35.5	36.8	0.659

Figure 3.1 represents the use of medication by ATC category between sites in 2000.

Figure 3.1 Medication by ATC categories between sites 2000

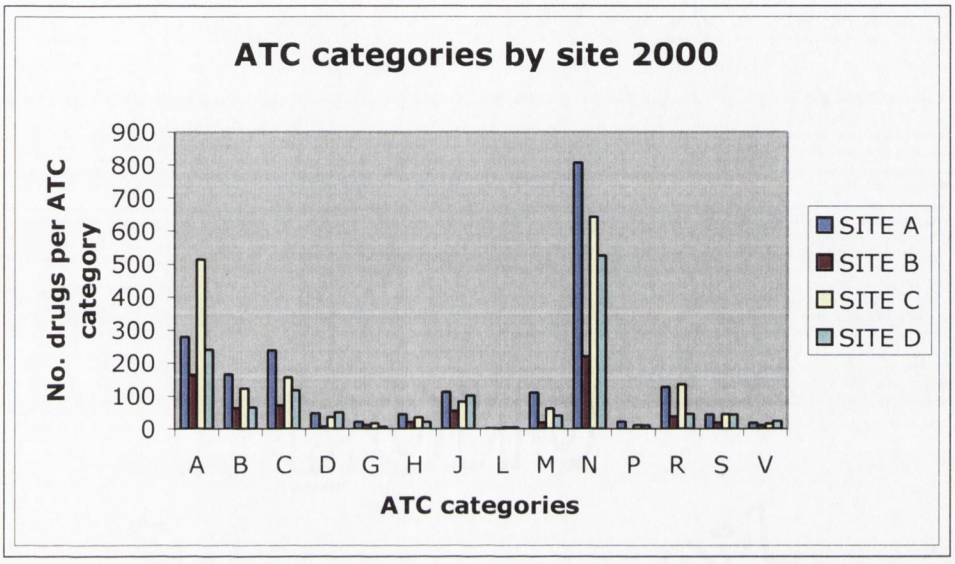
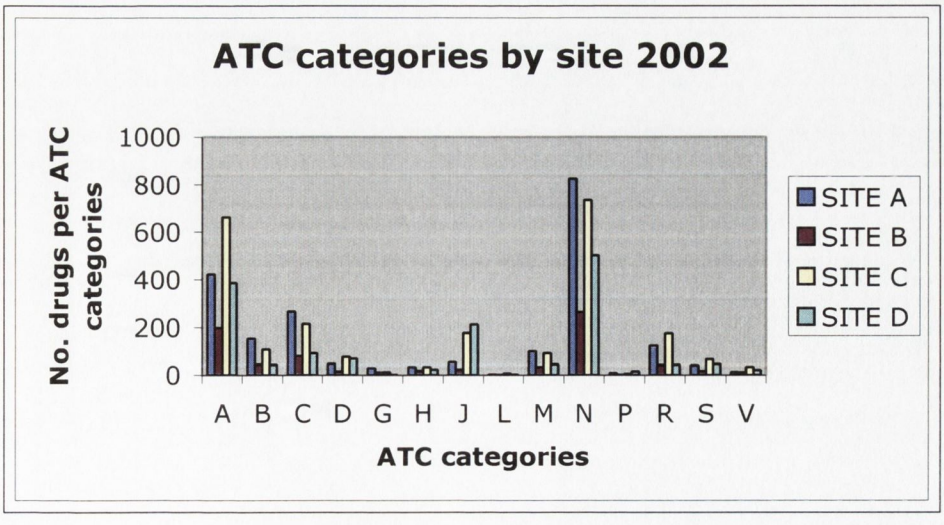


Figure 3.2 represents the use of medication by ATC category between sites in 2002.

Figure 3.2 Medication by ATC categories between sites 2002



3.5 The most commonly prescribed drugs

Table 3.5.1 compares the most frequently prescribed drugs in 2000 and 2002. The data includes PRNs. There has been an increase in prescriptions for paracetamol and metoclopramide. Temazepam prescribing has decreased. Although prescriptions for diazepam have decreased, there has been an associated increase in prescriptions for diazemuls injection and prochlorperazine, and in the use of lorazepam. There has also been an overall increase in the prescribing of laxative medicines. There has been a slight increase in the uptake of influenza vaccine and in the use of folic acid. The use of frusemide, digoxin and Augmentin stays at similar levels. Although prescribing of frusemide remains at a similar level, there is an overall decrease in the use of diuretics. Some drugs such as thioridazine are being gradually withdrawn from use.

Table 3.5.1 Top twenty most commonly drugs prescribed in 2000 and 2002:

	Drug name	**Number of prescriptions 2000**		**Drug name**	**Number of prescriptions 2002**
1.	*Paracetamol*	320	1.	*Paracetamol*	369
2.	*Temazepam*	269	2.	*Diazemuls*	255
3.	*Diazepam*	243	3.	*Lactulose*	229
4.	*Lactulose*	171	=	*Temazepam*	229
5.	*Aspirin 75*	151	5.	*Prochlorperazine*	186
6.	*Metoclopramide*	145	6.	*Metoclopramide*	161
7.	*Prochlorperazine*	129	7.	*Resprin*	150
8.	*Aspirin 300*	117	8.	*Flu vaccine*	141
9.	*Influenza vaccine*	115	9.	*Senokot*	122
10.	*Frusemide*	110	=	*Aspirin*	122
11.	*Milpar*	101	11.	*Milpar*	117
12.	*Thioridazine*	96	12.	*Lasix*	106
13.	*Digoxin*	76	13.	*Augmentin*	93
14.	*Augmentin*	74	14.	*Folic acid*	85
15.	*Furosemide combination*	69	15.	*Lomotil*	80
16.	*Madopar*	68	=	*Digoxin*	80
=	*Distalgesic*	68	=	*Combivent*	80
18.	*Folic acid*	66	18.	*Risperidone*	74
=	*Lansoprazole*	66	19.	*Microlax enema*	72
20	*Salbutamol*	60	20.	*Distalgesic*	71
=	*Risperidone*	60	21.	*Lorazepam*	70

Table 3.5.2 presents the top twenty most expensive medicines in use in 2000 and gives numbers of residents prescribed them. Durogesic is an opiate drug, which is dispensed in patches that last for 72 hours, so although the initial outlay is high the overall cost is less prohibitive. Inhalers such as Pulmicort, Flixotide and Combivent are expensive to purchase for each resident, as shown in the table, but last for at least 50 doses. Intravenous antibiotics are expensive, but are not used as first line management .

Table 3.5.2 Top twenty most expensive medications (October 2000):

	Name of medication	**€ Cost per item**	**No of residents**
1.	*Durogesic 100*	38.40	1
2.	*Desmo Spray*	30.77	1
3.	*Pulmicort*	29.69	8
4.	*Regain*	25.39	1
5.	*Xalatan drops*	20.13	4
6.	*Durogesic 75*	19.15	1
7.	*Rocephin injection*	15.71	8
8.	*Durogesic 50*	13.74	1
9.	*Claforan injection*	13.33	3
10.	*Actrapid*	12.98	4
11.	*Diclofenac*	10.01	4
12.	*Clexane*	9.64	1
13.	*Flixotide nebuliser*	9.19	2
14.	*Pilogel*	8.95	1
15.	*Anugesic*	8.44	1
16.	*Combivent inhaler*	8.08	22
17.	*Feldene gel*	7.61	3
18.	*Emulsiderm*	7.61	4
19.	*Glucagon*	7.58	6
20.	*Durogesic 25*	7.35	2

Table 3.5.3 shows the top twenty most expensive drugs being prescribed in 2002. The list has changed markedly during the eighteen-month period. The most expensive drug, Prostap, is relatively new to the market. Inhalers are still high up on the list as are intravenous antibiotics. Solutions, gels and ointments are found in the list, as they have been allocated the cost per item, e.g., cost per tube, rather than for individual units of administration. There are examples of specialist medication such as Trosyl for nail fungus infections and Iruxol for necrotic decubitus ulcers. Other reasonably expensive medication that does not appear in this table has an impact due to the large number of residents receiving them. Examples of these are Combivent inhalers @ €8.08 per unit, prescribed for 80 residents, and the influenza vaccine @ €5.08 per unit, prescribed for 141 residents.

Table 3.5.3 Top twenty costs of medication April 2002:

	Name of medication	€ Cost per item	No. of residents
1.	*Prostap injection*	163.01	5
2.	*Trosyl solution*	35.17	1
3.	*Seretide inhaler*	31.72	2
4.	*Desmospray*	30.77	2
5.	*Pulmicort inhaler*	29.69	11
6.	*Vancomycin injection*	26.16	1
7.	*Flixotide inhaler*	24.80	5
8.	*Oxygen*	23.81	24
9.	*Glucagon injection*	22.58	8
10.	*Acyclovir injection*	21.91	1
11.	*Famvir*	18.63	2
12.	*Rocephin injection*	15.77	20
13.	*Pneumovax injection*	14.22	9
14.	*Amikin injection*	13.89	4
15.	*Iruxol ointment*	12.93	1
16.	*Isotrexin gel*	12.70	1
17.	*Mixtard injection*	12.25	4
18.	*Lamisil cream*	11.90	1
19.	*Transtec*	10.32	6
20.	*Orugesic gel*	10.20	1

3.6 Comparison of individual medicines between sites

Table 3.6 presents the patterns of prescribing of drugs by site.

Table 3.6 Comparison of individual medicines between sites:

	% Site A	% Site B	% Site C	% Site D
Laxatives 2000	20.28	41.33	66.42	53.24
Laxatives 2002	45.08	51.95	72.11	80.71
Aspirin 75mg 2000	29.25	22.67	23.13	28.78
Aspirin 75mg 2002	29.53	14.29	15.65	22.14
Aspirin 300mg 2000	8.96	4	58.96	6.47
Aspirin 300mg 2002	9.33	24.68	60.54	8.57
Antibacterial 2000	19.14	18.67	35.07	49.64
Antibacterial 2002	15.03	15.58	49.66	62.86
Paracetamol 2000	33.97	48	85.82	76.98
Paracetamol 2002	36.79	67.53	88.44	76.43
NSAIDs 2000	36.36	13.33	26.12	24.46
NSAIDs 2002	37.31	19.48	35.37	25.76
Any CNS 2000	97.64	92	99.25	100
Any CNS 20002	97.93	97.4	100	98.57
Antipsychotics 2000	67.94	44	32.09	49.64
Antipsychotics 2002	73.58	37.66	34.01	50
Anxiolytics 2000	28.71	12	98.51	42.45
Anxiolytics 2002	45.08	28.57	97.96	50.71
Hypnotics 2000	69.38	40	37.31	84.17
Hypnotics 2002	68.91	35.06	39.46	76.43
Antidepressants 2000	34.93	37.33	36.57	35.25
Antidepressants 2002	36.79	38.96	40.82	31.43
Any respiratory 2000	41.98	29.33	50	23.74
Any respiratory 2002	38.86	32.47	63.27	24.29
Anti-asthmatics 2000	27.75	17.33	29.1	10.07
Anti-asthmatics 2002	36.79	38.96	40.82	31.43
CVS drugs 2000	61.32	61.33	60.45	48.92
CVS drugs 2002	66.84	59.74	70.07	42.14

3.7 Medications identified as markers of quality markers

Figure 3.7.1 presents the results of prescribing of any CNS medication in 2000 and 2002; it reflects a high level of prescribing for all residents, with increased prescribing in Site A, Site B and Site C over time. In 2000 there was a difference in prescribing between sites ($p<0.0018$). Residents in Site B were less likely to be prescribed CNS medication, but this had increased by 2002. In 2002 there was no difference in prescribing rates between sites ($p=0.15$), although all residents in Site C (100%) had a prescription for CNS medication.

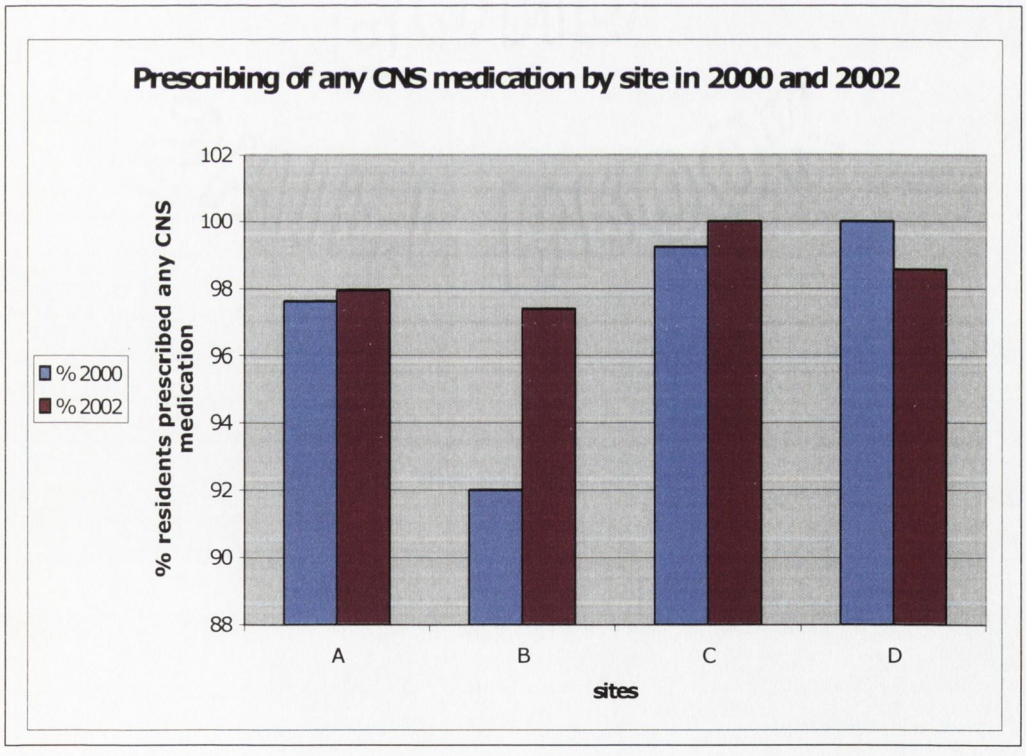


Figure 3.7.1

Figure 3.7.2 presents the results of antipsychotic prescribing in residents in 2000 and 2002. In 2000 there was a statistically significant difference in prescribing between sites ($p<0.0001$). Residents in Site A appear most likely to be prescribed antipsychotics, which has increased over time to 73.6%. The residents in Site C were the least likely to be prescribed antipsychotic drugs. In 2002 the difference in prescribing is still present ($p<0.0001$). There has been a marginal increase in Site C and Site D: the usage in Site B has decreased.

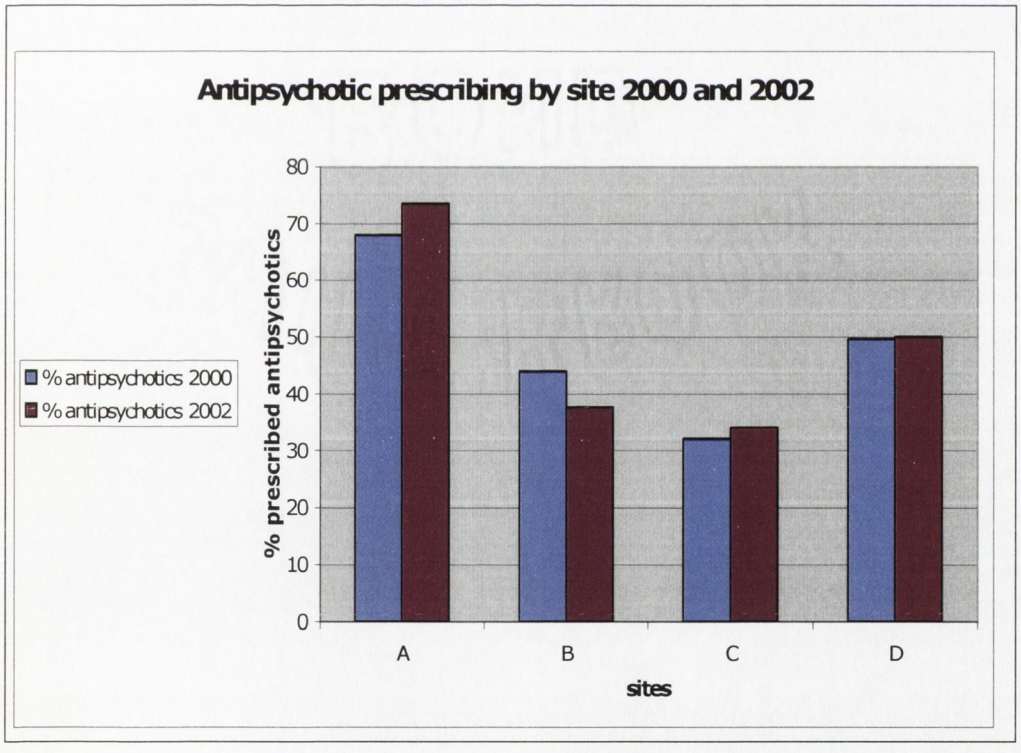


Figure 3.7.2

Figure 3.7.3 presents the results for antidepressant therapy in 2000 and 2002. There was no difference in prescribing between sites in 2000 (p=0.96) and 2002 (p=0.4). There was a slight increase in prescribing in Site A, Site B and Site C over time; in 2002 there was a slight decrease in usage in Site D.

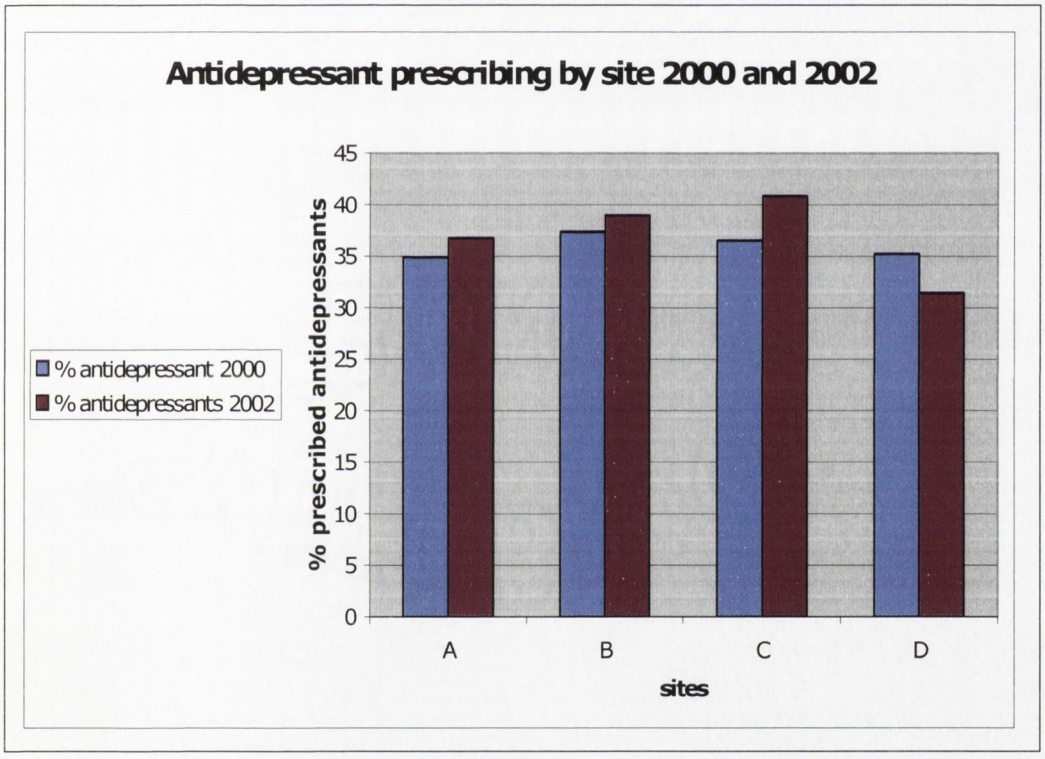


Figure 3.7.3

Figure 3.7.4 presents results for residents prescribed laxatives in 2000 and 2002. It shows a trend towards increased prescribing of laxatives in all four sites. There was a statistically significant difference between prescribing laxatives between sites in 2000 ($p<0.0001$) and 2002 ($p<0.0001$). In 2000 residents in Site C were more likely to receive laxatives (66.4%), and in 2002 residents in Site C (63.3%) and Site D (80.7%) were prescribed more laxatives.

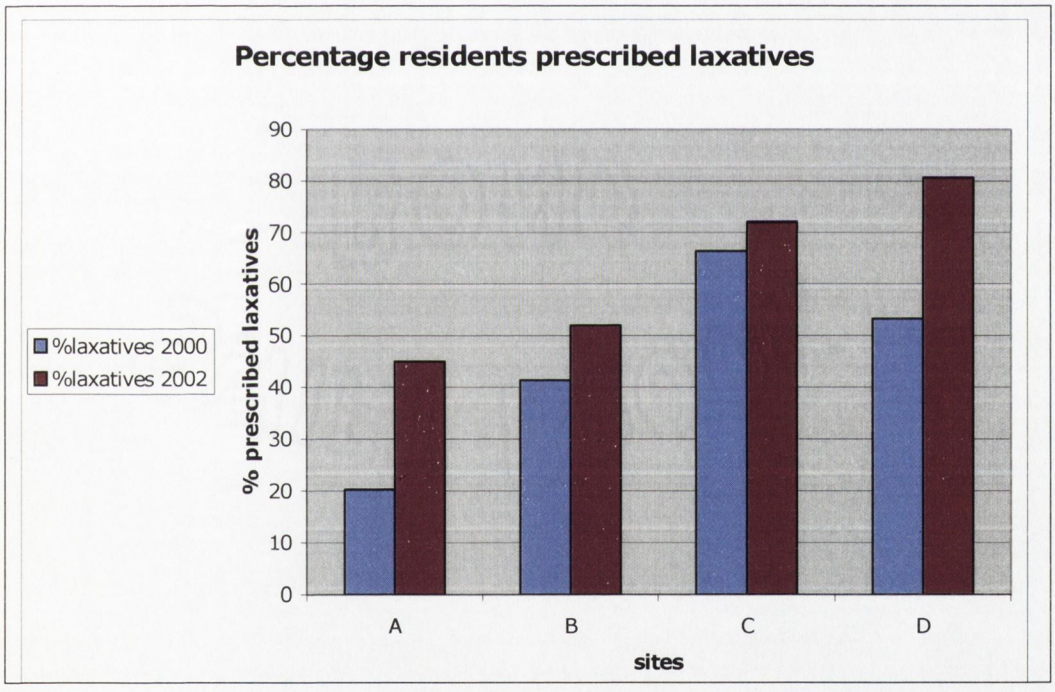


Figure 3.7.4

Figure 3.7.5 presents the results of hypnotic prescribing in 2000 and 2002. There were statistically significant differences in prescribing between sites both in 2000 ($p<0.0001$) and again in 2002 ($p<0.0001$). Residents in Site A and Site D were more likely to be prescribed hypnotics in both 2000 and 2002 than residents in the other two sites. 84% of residents in Site D were prescribed hypnotics in 2000. The overall prescribing rates for hypnotics has decreased slightly over time, except in Site C where it has increased slightly in 2002.

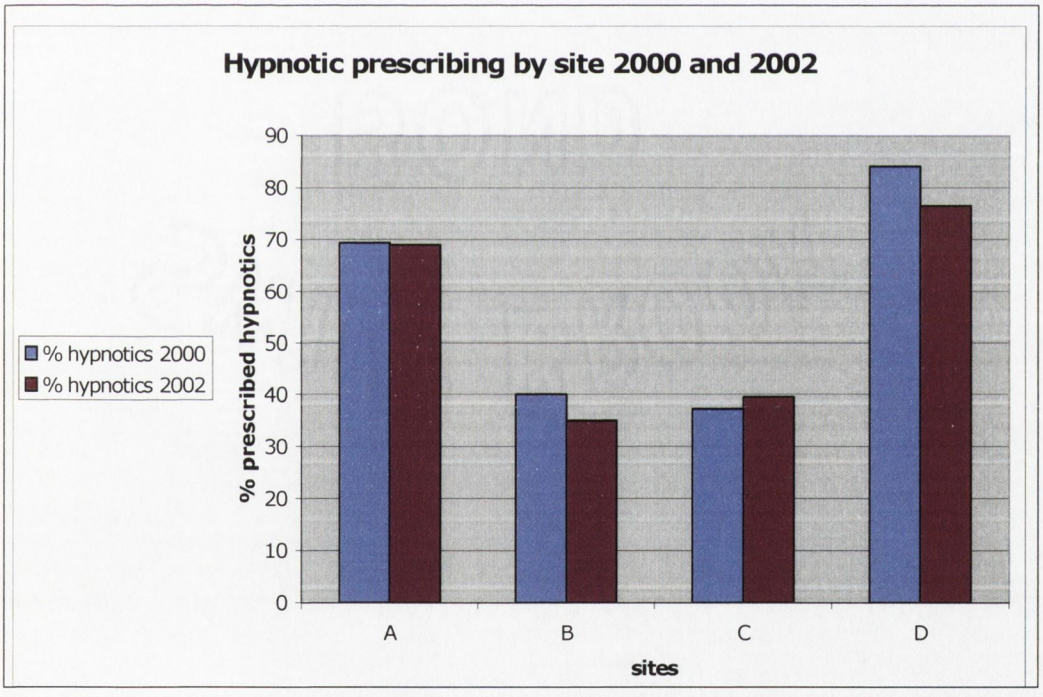


Figure 3.7.5

Figure 3.7.6 presents patterns of paracetamol prescribing in 2000 and 2002 and shows a trend for some increased prescribing for residents in Sites A, B and C. There was a statistically significant difference in prescribing between sites in 2000 ($p<0.0001$); residents in Sites C (85.8%) and D (77%) appear more likely to have prescribed paracetamol. There was also a difference in prescribing between sites in 2002 ($p<0.0001$). Site A, Site B and Site C increased their use, Site C to 88%, with a small decrease in Site D.

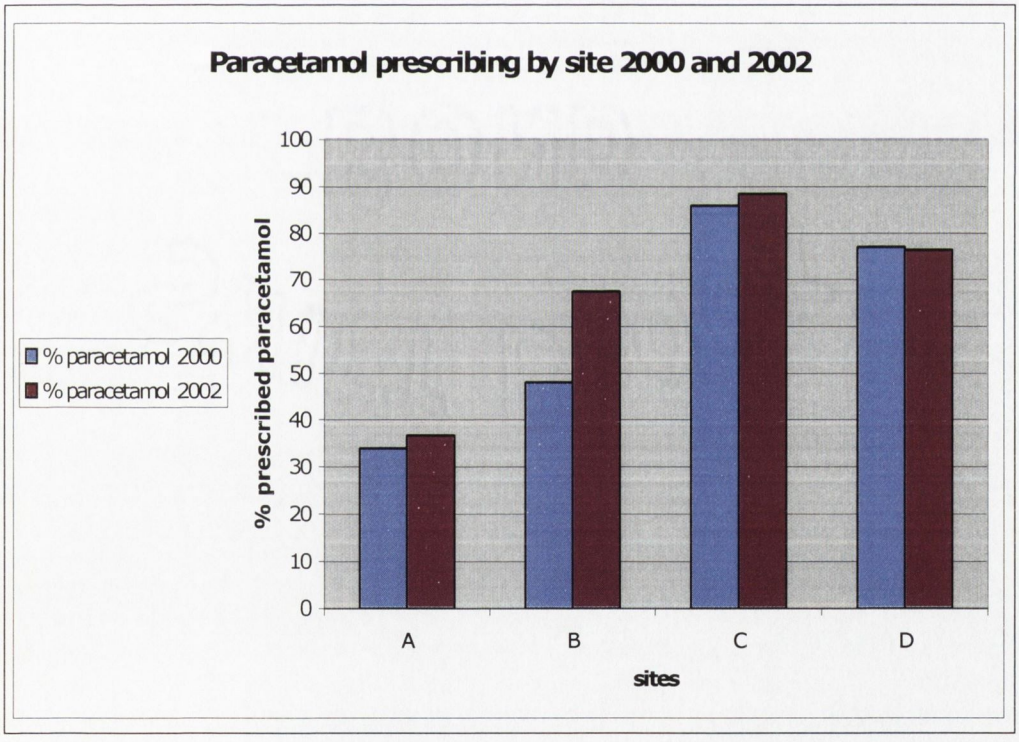


Figure 3.7.6

Figure 3.7.7 presents NSAID s prescribing for 2000 and 2002 and shows a trend towards increased prescribing in all sites. There was a statistically significant difference in levels of prescribing between sites in 2000 ($p<0.0006$). There was also a difference in 2002 ($p<0.0081$). Residents in Site B were less likely to be prescribed NSAIDs in both 2000 and 2002 than residents elsewhere.

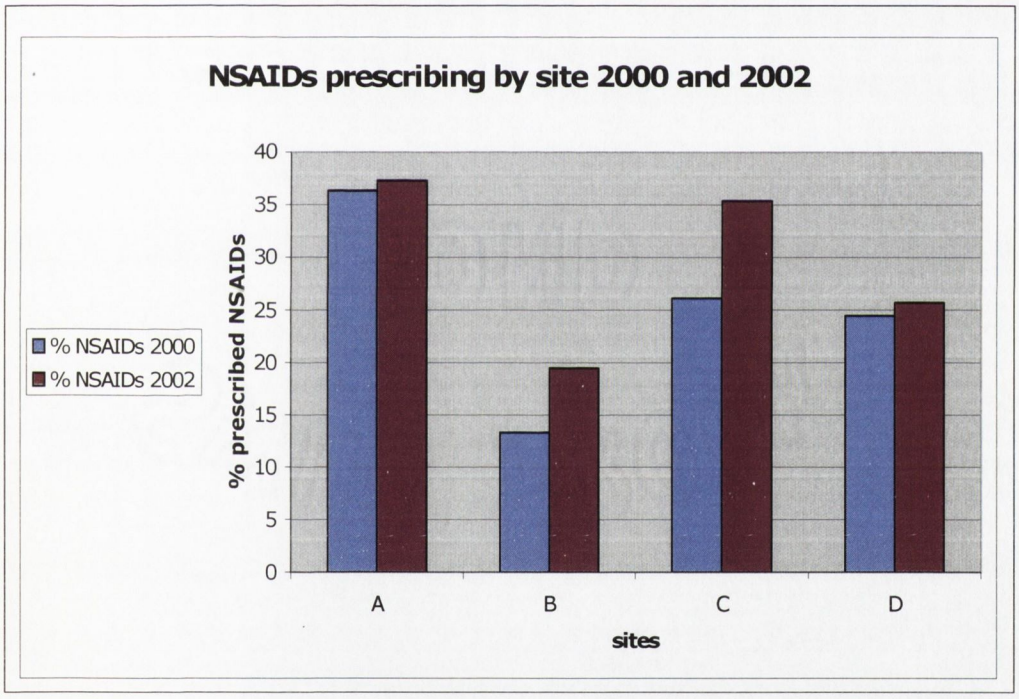


Figure 3.7.7

Figure 3.7.8 presents the results of aspirin 75mg prescribing by site in 2000 and 2002. There was no statistical difference between the sites in 2000 ($p=0.5$); there was a statistically significant difference between prescribing rates in 2002 ($p<0.006$). In 2002 prescribing levels are not statistically different between sites. However, in 2002 the residents in Site A and Site D appear more likely to receive aspirin 75 than their counterparts in the other sites, although the use in Site D has decreased over time. The use of aspirin 75mg has decreased in Site B, Site C and Site D.

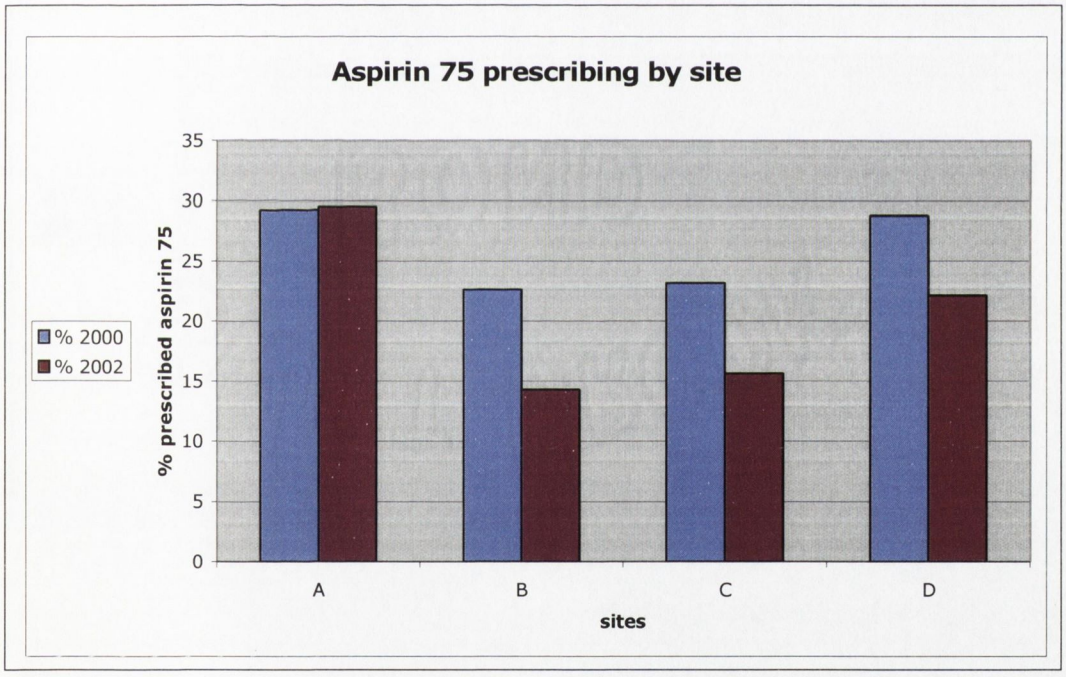


Figure 3.7.8

Figure 3.7.9 presents the results of aspirin 300 prescribing. There was a statistically significantly difference in prescribing between sites in both 2000 ($p<0.0001$) and 2002 ($p<0.0001$). Residents in Site C were prescribed more Aspirin 300mg in both 2000 (59%) and 2002 (60.5%) than residents elsewhere. There was an increase in prescriptions in Site B in 2002.

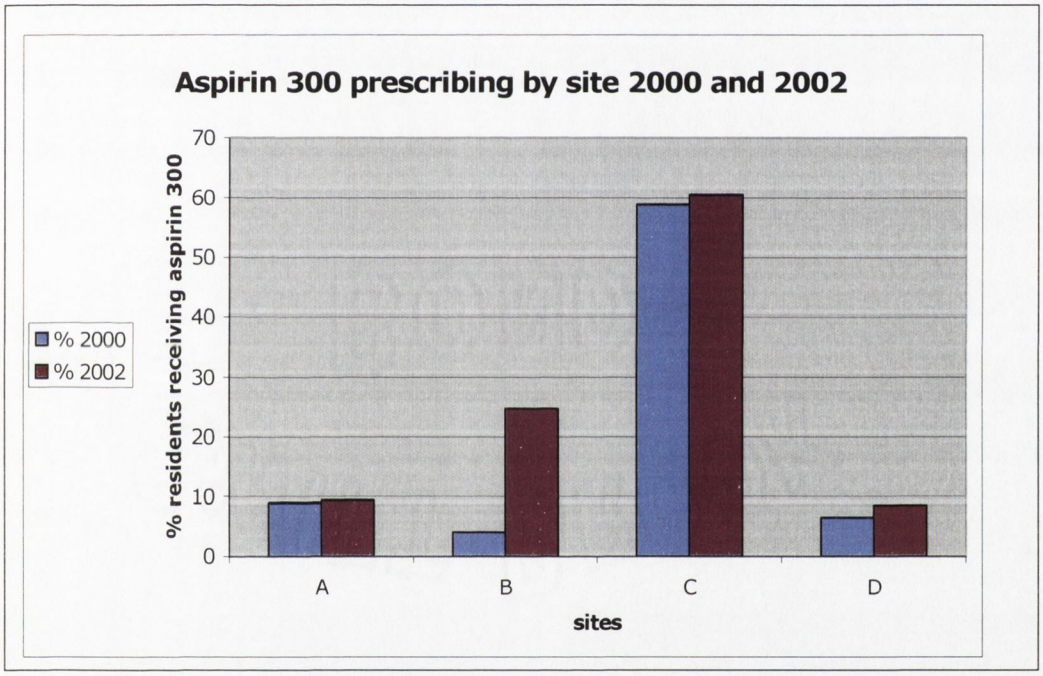


Figure 3.7.9

3.8 Barthel Indices and MMSEs

3.8.1 Barthel Index and MMSE results

The MMSE was recorded for 342 residents (61.1%) in 2000 and 470 (84.4%) in 2002. The Barthel Index was recorded for 432 residents (77%) in 2000 and 501 residents (89.9%) in 2002. The characteristics of residents in all four sites are given in Table 3.7.1 by gender, median age, Barthel Index score $\leq$20 (maximum dependency), and MMSE $\leq$23 (cognitively impaired). The gender and age profiles remain fairly constant during the period under study. There are consistently no male residents in Site D.

The Barthel Index scores in Site A have remained similar over time, while the MMSE scores appear to have improved. There is a slight increase in the Barthel Index scores in Site B, while the numbers of residents with low MMSE scores had decreased. Residents in Site C show deterioration in Barthel Index scores from 2000 to 2002 reflecting an increase in the physical dependency of the residents, and an improvement in MMSE scores suggesting a change in the profile of residents with cognitive impairment. The profile of the residents in Site D remains similar over time.

Table 3.8.1 Characteristics of residents by site by Barthel Index and MMSE:

	October 2000	**April 2002**
Site A *No. residents*	212	193
Female (%)	61%	63%
Male (%)	39%	37%
Median age of residents	78.6	81
Barthel ≤20	53%	49.7%
MMSE ≤23	90%	74.3%
Site B *No. residents*	75	77
Female (%)	59%	60%
Male (%)	41%	40%
Median age of residents	82.3	82
Barthel ≤20	41.1%	57.3%
MMSE ≤23	83.3%	60.9%
Site C *No. residents*	134	147
Female (%)	70%	65%
Male (%)	30%	35%
Median age of residents	80.7	80
Barthel ≤20	27%	50.4%
MMSE ≤23	94.7%	62.1%
Site D	139	140
Female (%)	100%	100%
Male (%)	0%	0%
Median age of residents	83.0	82
Barthel ≤20	65.7%	63%
MMSE ≤23	93.5%	95.5%
Total no. residents	**560**	**557**

3.8.2 Prescription rates relating to MMSE

Table 3.8.2 shows the percentage of residents receiving medication by MMSE score in 2000 and 2002. The Chi-square test was used to compare percentages of prescribing between residents scoring ≤23 and ≥23. Prescribing of aspirin 300, antibacterials, anxiolytics appear to differ between MMSE scores in 2000 and 2002. In addition, differences in prescribing of laxatives, paracetamol, antipsychotics and hypnotics were observed in 2002.

Table 3.8.2 Medication received by residents by MMSE:

Name of medication	**% resident MMSE ≤23 2000**	**% resident MMSE >23 2000**	**Chi-square, p-value**	**% resident MMSE ≤23 2002**	**% resident MMSE >23 2002**	**Chi square, p-value**
Laxatives	42.61	37.50	0.5675	65.84	47.32	0.0004**
Nutrients	9.28	15.63	0.2717	8.76	8.04	0.8061
Aspirin 75	27.27	18.75	0.2736	22.02	21.43	0.8920
Aspirin 300	20.45	6.25	0.0271*	22.25	34.82	0.006*
Antibacterial	31.44	12.50	0.0145*	39.78	22.32	0.0006**
Paracetamol	59.28	53.13	0.4943	66.97	55.36	0.0216*
NSAIDs	27.46	34.38	0.4064	31.01	33.04	0.68
Any CNS drugs	97.92	96.88	0.7101	98.88	97.32	0.2531
Antipsychotic	52.08	43.75	0.3575	55.06	41.07	0.0080*
Anxiolytics	49.43	21.88	0.0018**	60.45	49.11	0.0305*
Hypnotics	61.55	59.38	0.8064	62.02	43.75	0.0005**
Antidepressants	35.42	37.50	0.8117	36.40	38.39	0.6972
Any respiratory	37.69	37.50	0.9829	39.33	46.43	0.1734
Anti-asthmatics	21.59	31.25	0.2191	22.25	33.04	0.205
Any cardiovascular	57.58	65.63	0.3655	58.88	66.96	0.1176

3.8.3 Total prescribing by Barthel Score

Table 3.8.3 presents results of prescribing by Barthel score in 2000 and 2002. The percentages of residents in each Barthel category are presented.

Table 3.8.3 Prescribing by Barthel Score:

Type of medication	Barthel score	% 2000	% 2002
Laxatives	1	42.54	70.8
	2	39.25	54.84
	3	30.26	45.71
	4	19.05	57.58
Aspirin 75mg	1	29.39	21.17
	2	30.84	25.81
	3	25	22.86
	4	14.29	9.09
Aspirin 300mg	1	9.65	23.72
	2	11.21	19.35
	3	23.68	18.57
	4	9.52	39.39
Antibacterials	1	27.63	44.16
	2	32.71	32.26
	3	26.32	17.14
	4	23.81	24.24
Paracetamol	1	54.39	67.52
	2	57.94	60.48
	3	48.68	57.14
	4	57.14	60.61
NSAIDs	1	24.56	28.83
	2	33.64	26.61
	3	39.47	37.14
	4	19.05	39.39
Any CNS	1	99.56	99.27
	2	97.2	97.58
	3	97.37	97.14
	4	90.48	96.97
Antipsychotics	1	56.58	54.74
	2	56.07	55.65
	3	50	42.86
	4	47.62	42.42
Anxiolytics	1	38.6	59.49

	2	40.19	51.61
	3	39.47	47.14
	4	33.33	66.67
Hypnotics	1	73.68	66.06
	2	68.22	51.61
	3	57.89	50
	4	47.62	51.52
Antidepressants	1	34.21	34.31
	2	40.19	34.68
	3	31.58	48.57
	4	33.33	30.3
Any respiratory drug	1	34.65	39.05
	2	30.84	41.13
	3	40.79	35.71
	4	52.38	45.45
Anti-asthmatics	1	19.3	21.9
	2	19.63	24.19
	3	25	27.14
	4	33.33	30.3
CVS drugs	1	53.51	54.38
	2	60.75	66.13
	3	65.79	64.19
	4	57.14	66.67

Figure 3.8.1 presents results of any CNS prescribing by Barthel categories in 2000 and 2002. There was a statistically significant difference in prescribing by categories in 2000 (p=0.05). 99.6% of the most severely dependent residents in category 1 were prescribed CNS medicines, while 90.5% of residents in category 4, the least dependent were prescribed these drugs. There was no significant difference in prescribing between categories in 2002 (p=0.39). Prescribing increased in categories 2 and 4, and decreased in categories 1 and 3 over time.

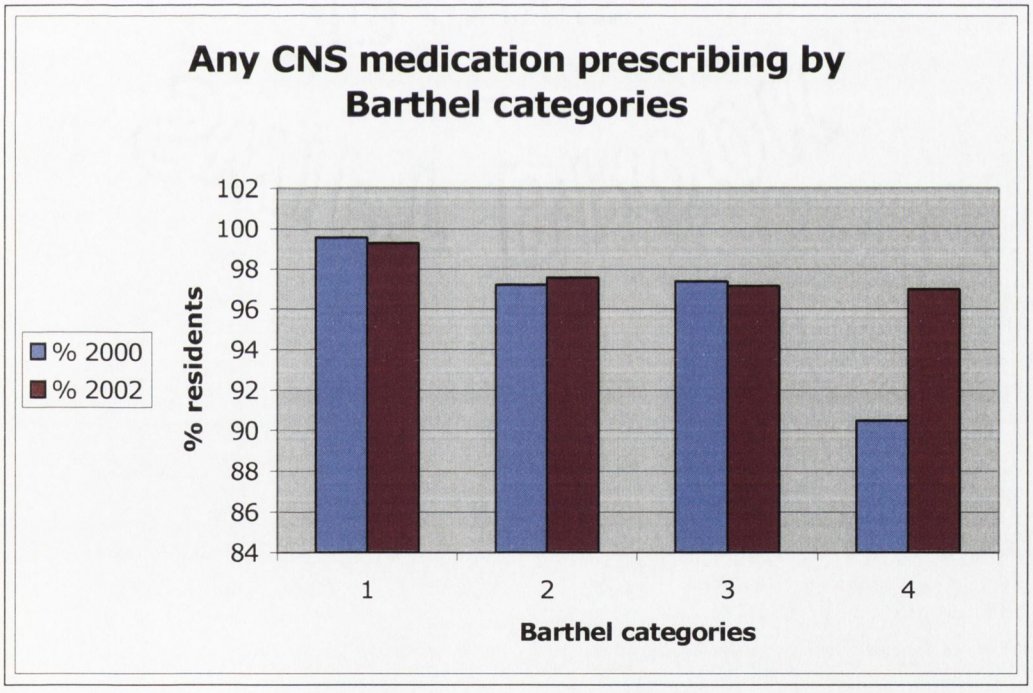


Figure 3.8.1

Figure 3.8.2 presents results of antipsychotic prescribing in 2000 and 2002. It shows a large number of these medicines being prescribed, with over half of the more dependent residents in categories 1, 2 and 3 receiving these drugs. There is a trend towards less prescribing of these drugs over time. There were no significant differences in prescribing by categories in 2000 (p=0.68) or 2002 (p=0.17).

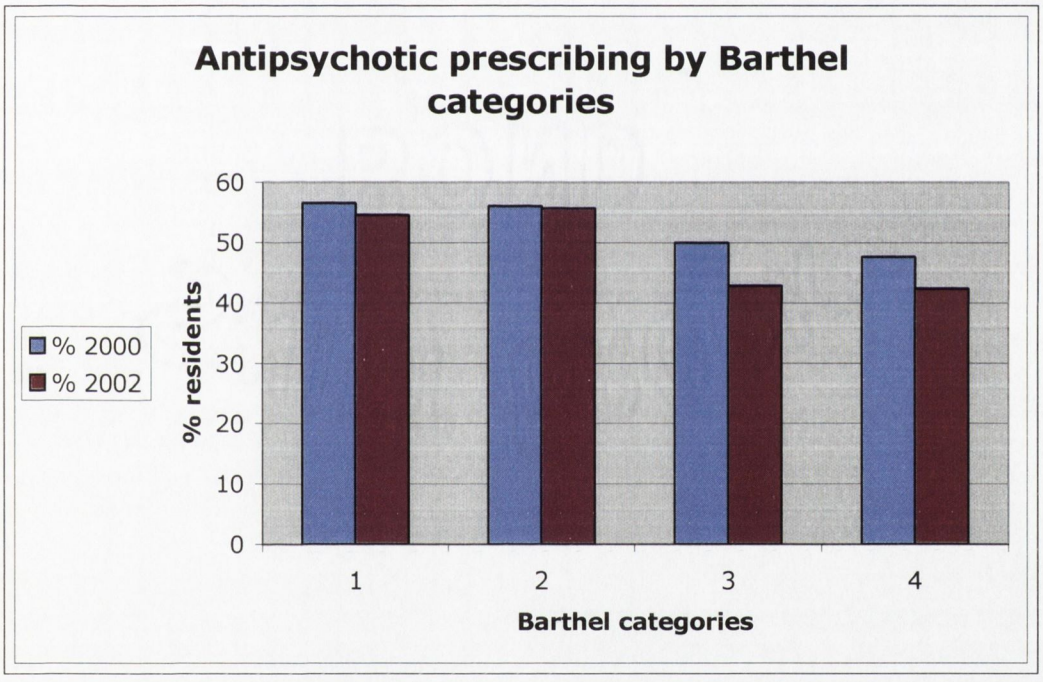


Figure 3.8.2

Figure 3.8.3 presents the prescribing of antidepressant medication by Barthel categories in 2000 and 2002. There was no difference in prescribing by category in 2000 (p=0.6) or 2002 (p=0.14). There is no change in prescribing for the most dependent residents in category 1. There is an increase in category 3, with nearly half (48.6%) of the residents receiving these drugs in 2002. There is a decrease for residents in categories 2 and 4.

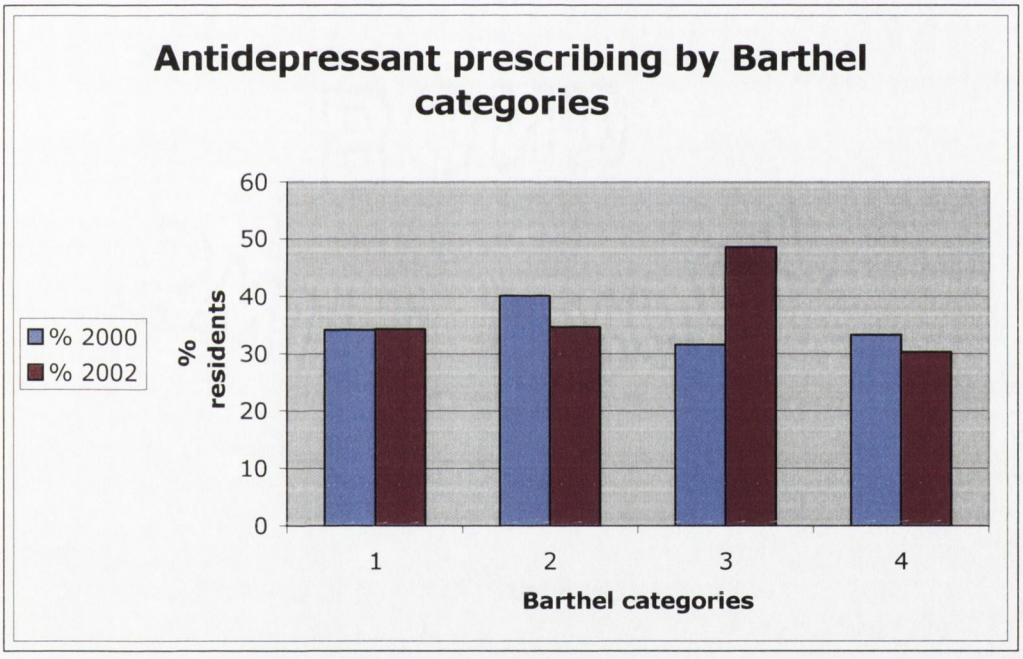


Figure 3.8.3

Figure 3.8.4 presents the rate of laxative prescribing by Barthel category in 2000 and 2002, which show an increased rate of prescribing in all categories. There was a statistically significant difference in prescribing between categories in both 2000 ($p=0.05$) and 2002 ($p<0.0001$). More independent residents in category 4 were least likely to be prescribed laxatives in 2000, but the numbers have increased over time. 42.5% of severely dependent residents in category 1 received laxatives in 2000 and this increased to 68.5% in 2000. There is a trend towards more prescribing for residents who are more dependent, with the test for trend significant at $p<0.0002$.

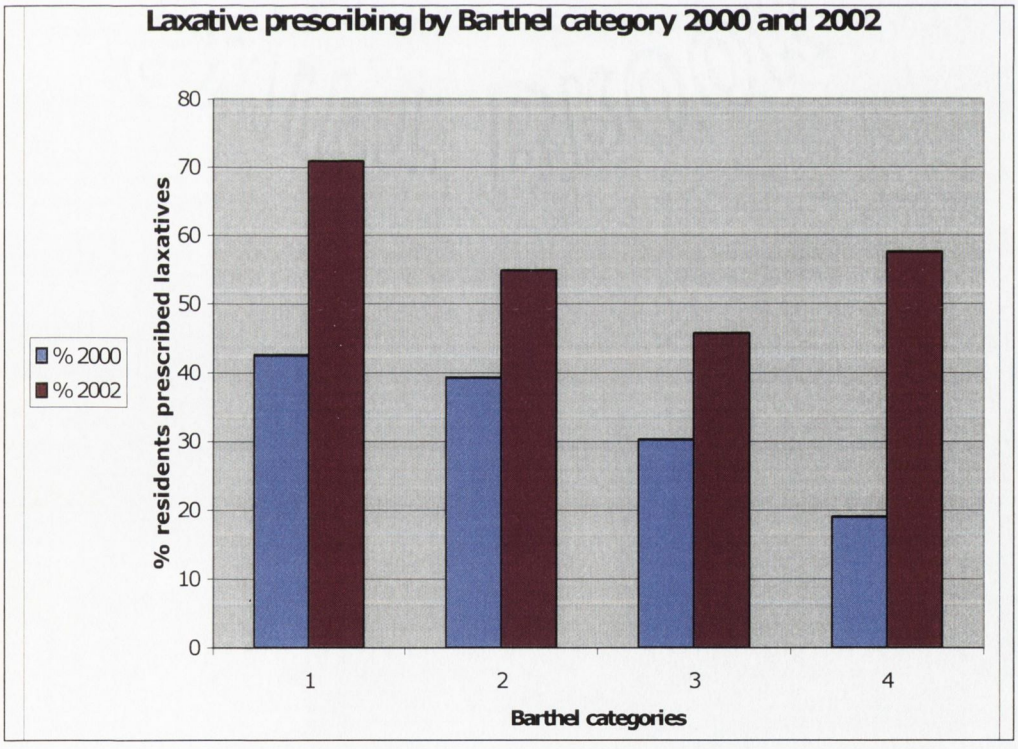


Figure 3.8.4

Figure 3.8.5 presents the results of hypnotic prescribing by Barthel categories in 2000 and 2002. There was a large number of residents prescribed hypnotics, with 73.7% residents in category 1, the most dependent, receiving them in 2000. There was no difference in prescribing between categories in 2000 (p=0.95). There is a statistically significant trend for less prescribing in all categories of resident over time (p=0.0036) There was a significant difference in prescribing between categories in 2002 (p=0.009). Prescribing in category 1 remains high in 2002 at 66.1%.

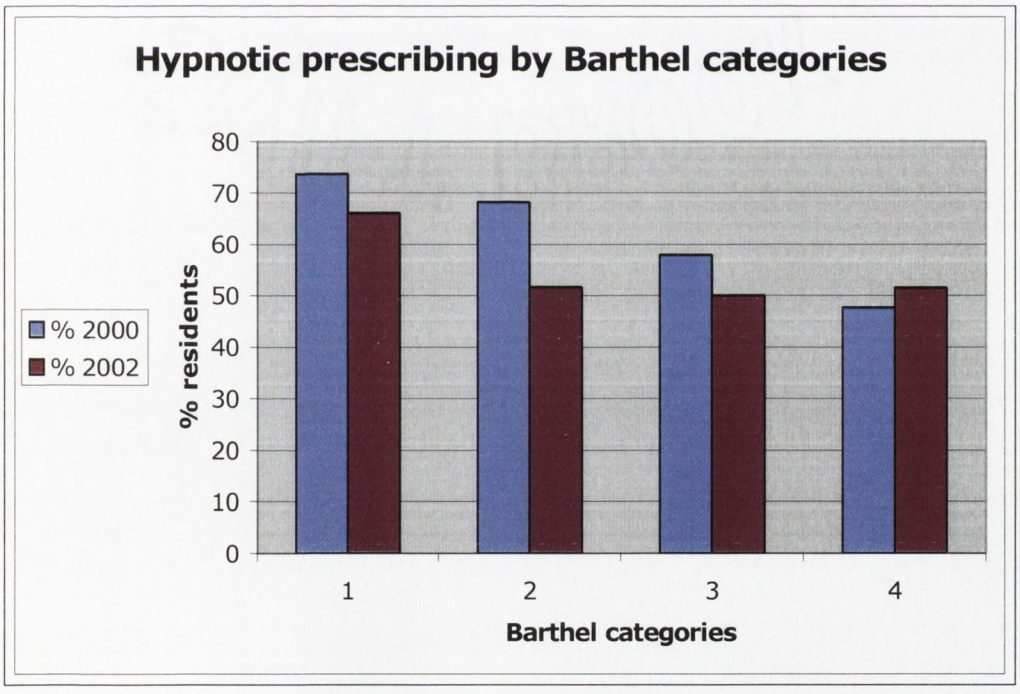


Figure 3.8.5

Figure 3.8.6 presents the results of paracetamol prescribing by Barthel categories in 2000 and 2002, and shows a trend towards increased prescribing over time. 67.5% of the most dependent resident in category 1 had the most prescriptions for paracetamol in 2002. There was no significant difference in prescribing between categories in either 2000 (p=0.66) or 2002 (p=0.30).

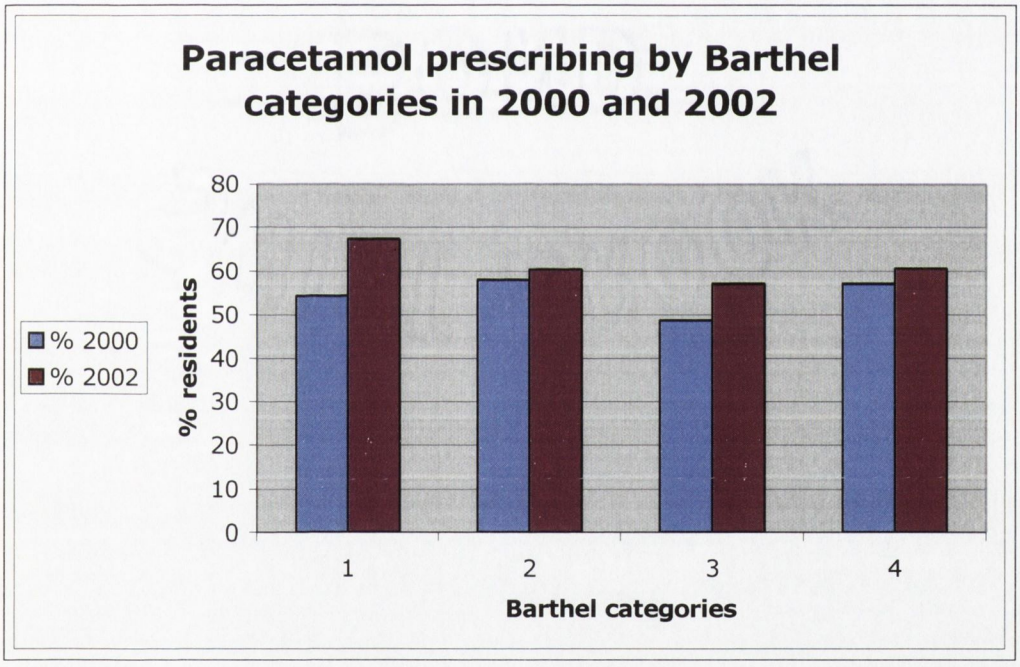


Figure 3.8.6

Figure 3.8.7 presents results of NSAIDs prescribing by Barthel categories in 2000 and 2002, showing an increase in prescribing for residents in both categories 1 and 4. There was a difference in prescribing by categories in 2000 (p=0.04), with residents in category 4 the least likely to be prescribed NSAIDs. There was no difference in prescribing by categories in 2002 (p=0.28), with 39.4% of residents in category 4 most likely to have a prescription for NSAIDs.

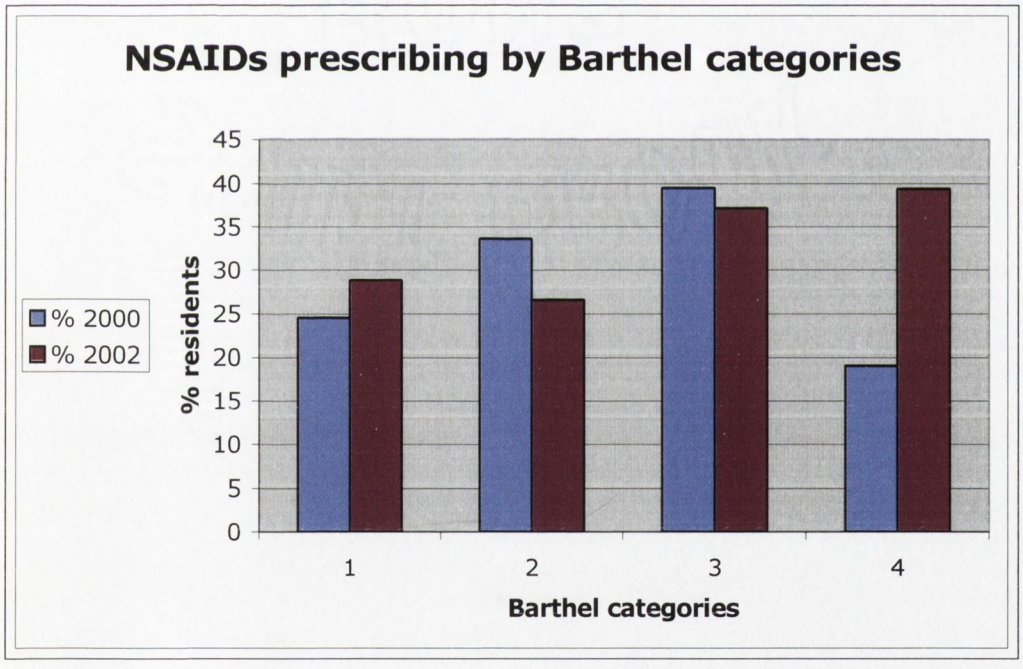


Figure 3.8.7

Figure 3.8.8 presents the results of aspirin 75mg prescribing by Barthel categories, showing a decreased use over time in all categories. There was no significant difference in prescribing by categories in either 2000 (p=0.36) or 2002 (p=0.17). In 2000 residents in category 1 and 2, the more dependent people, appear to have received the most aspirin 75mg: however, the prescribing rate in category 1 has decreased over time. There was a low rate of prescribing residents in category 4 as only 9.1% received aspirin in 2002.

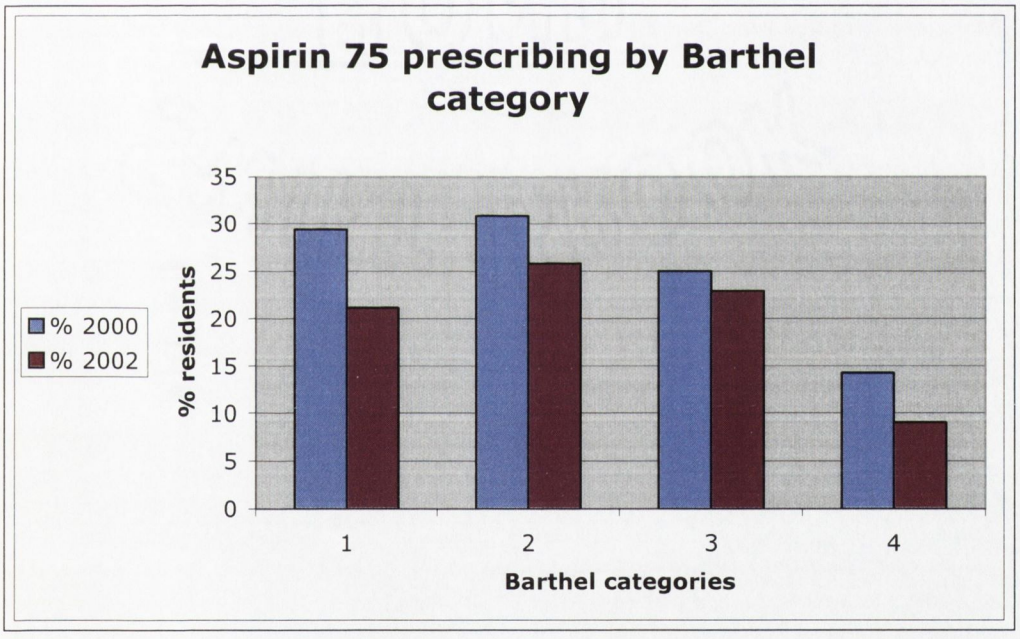


Figure 3.8.8

Figure 3.8.9 presents the results of prescribing for aspirin 300mg by Barthel categories in 2000 and 2002. There was no statistical difference in prescribing rates between categories in 2000 (p=0.36) or 2002 (p=0.17). There was an increase over time for prescribing in categories 1, 2 and 4, and a decrease for residents in category 3. The biggest increase was for those residents with least dependency in category 4 from 9.5% in 2000 to 45.5% in 2002.

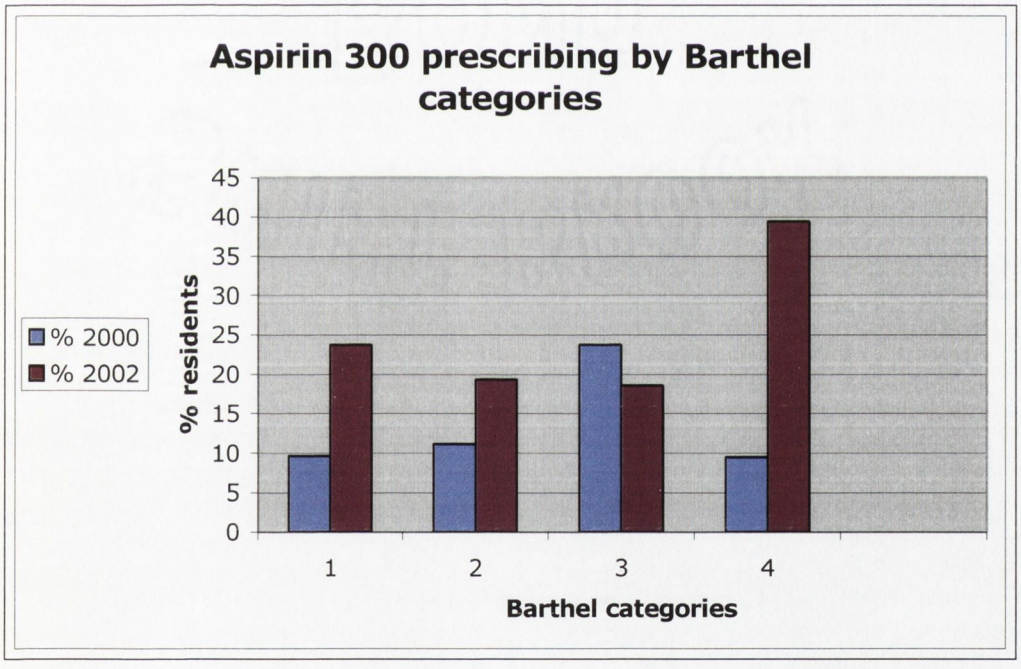


Figure 3.8.9

3.9 Comparison of staffing levels between sites

Table 3.9 presents the ratio of Registered General Nurses (RGN) to residents for both 2000 and 2002.

It can be seen that the staff/resident ratios, calculated according to the standard formula, increased slightly in site A, decreased marginally in site B and C and remained the same in site D over time.

Table 3.9 Comparison of staffing levels between sites:

	W.T.E.	Residents 2000	Daily RGN Hours 2000	Residents 2002	Daily RGN Hours 2002
Site A	75	212	1.56	193	1.71
Site B	31	75	1.82	77	1.77
Site C	54	134	1.77	147	1.62
Site D	60	139	1.89	140	1.89

3.10 Comparison of the use of medicines in long-stay units and the community

Table 3.10.1 presents a comparison of the use of drugs between long stay unit residents (cases) and community controls. The mean number of drugs prescribed in the controls was 5.2 $\pm$ 3.9 and 10.5 $\pm$ 4.0 in the cases ($p<0.01$). When PRN drugs were excluded the mean number in the cases was reduced to 7.0 $\pm$2.9. The percentage of controls receiving a single prescription was 11.6% (n=287) compared to 0.4% (n=2) in the cases. The percentage receiving 2-4 drugs in the controls was 41.3% (n=1022) compared with 4.9% (n=24) in the cases. The percentage of controls receiving 5 drugs or more was 47.1% (n=1166) compared with 94.8% (n=469) in the cases

The prescribing costs are given for both groups. The mean $\pm$ SD cost per control was €56.88 $\pm$ 67.3 compared to €188.56 $\pm$ 155.67 in cases. The mean cost per prescription was €11.03 $\pm$ 18.13 in controls compared to €18.06 $\pm$ 37.91 in the cases.

Table 3.10.1 Comparison of the use of drugs between long stay unit residents (cases) and community (controls):

	Long-stay residents (cases)	**Community/GMS (controls)**
Number of residents/patients	495	2475
Number (%) of females	370 (74.8%)	1850 (74.8%)
Mean (SD) number of drugs per resident/patient	10.5 (4.1)	5.2 (3.8)
Mean (SD) number of drugs per patient (excluding PRN. drugs)	7.0 (2.9)	5.2 (3.8)
Number (%) receiving: *1 drug*	2 (0.4%)	287 (11.6%)
2-4 drugs	24 (4.9%)	1022 (41.3%)
≥5 drugs	469 (94.8%)	1166 (47.1%)
Mean cost per person	€188.56 (SD155.67)	€56.88 (SD67.30)
Mean cost per prescription	€18.06 (SD37.91)	€11.03 (SD18.13)

Table 3.10.2 presents the distribution of the use of selected drug categories in the study population. Residents in the long-stay units were more likely to receive drugs related to the central nervous system, the alimentary tract, the respiratory tract, musculoskeletal system and anti-infectives, and less cardiovascular drugs. The percentages and odds ratios are given in the table below.

Table 3.10.2 Distribution of use of selected drug categories in long-stay residents versus community dwelling residents:

Drug class (ATC classification)	**Long-stay unit residents (cases)**	**Community Residents (controls)**	**Adjusted odds ratio (95% CI)**
Alimentary (A)	418 (84.4%)	948 (38.3%)	4.67 (3.53,6.16)***
Blood forming agents (B)	282 (57%)	812 (32.8%)	1.38 (1.08,1.75)***
Cardiovascular (C)	291 (58.8%)	1633 (66%)	0.37 (0.28,0.48)***
Antiinfective (J)	158 (31.9%)	395 (16%)	1.96 (1.50,2.58)***
Musculoskeletal (M)	173 (35%)	569 (23%)	1.32 (1.03,1.70)*
CNS (N)	484 (97.8%)	1421 (57.4%)	3.87 (2.94,5.09)***
Respiratory (R)	190 (38.4%)	449 (18.1%)	1.57 (1.21,2.03)***

CHAPTER FOUR:

DISCUSSION

4.1 DISCUSSION

4.1.1 Study design

The study was carried out in geriatric homes and hospitals in the Eastern Regional Health Authority area of Ireland. The most vulnerable and frail older people resident in extended care facilities are found in these institutions. The Ten Year Action Plan for the Eastern Health Board 1999-2008 (EHB 1998) identified that there was still a need for these long-stay geriatric hospitals, so there is merit in undertaking research related to improving the residents' quality of care.

Despite aspirations to community-based models of care, it is more expensive to maintain older people ate home than in long-stay facilities (Blackwell *et al.* 1992). . Once admitted, older people in Ireland spend 2 years for a man and 3 years for a woman in extended care facilities (Department of Social and Family Affairs 2002) although this may be longer for some individuals. Since long-stay geriatric hospitals will still play a key role in extended care for a large number of elderly people, the standards of care, including prescribing practices and their cost, warrant special consideration.

This is the largest sample size of older people in this type of residential care in Ireland to be reported to date. The four units should not be considered as representative of all long-term residential care in Ireland, as these units are registered as part of the national population of geriatric homes and hospitals. While the results may not be generalisable to

other long stay institutions, the comparison with the community base shows significant differences, and may be considered useful in considering future studies.

4.1.2 Cases versus controls

The study design did not allow for a control group, so it was decided to use a matched control of community residents. The residents were matched by age and gender to older people living in the community in the eastern region on the GMS database, in order to compare prescribing patterns. There are limitations to these comparisons since older people who were not eligible to receive medications on the GMS were excluded. In future studies, this would not be a consideration, as all people over the age of 70 years are now entitled to the GMS.

A further consideration is the use of OTC medicines in the community dwelling older people, whose use is not recorded in databases. The institutionalised residents in this study do not have access to self-medication, and therefore only receive those medicines that are ordered on their prescription charts. Wayne (2003) has been suggested that, since there has been a dramatic expansion in the number of effective medications that are available over the counter, this will affect the validity of using databases as the technique for studying the nature of medicine use.

4.1.3 Data collection

In order to achieve a large sample size, the data collection process was complicated, and would have benefited from increased manpower resources. The long-stay units selected were located in rural areas, and at some distance apart. This is an area of management that would have warranted further attention during the study design. Although the extensive communication process had elicited many staff that were interested in participating in data collection, unfortunately the project coincided with the national nursing shortage. This meant that despite good intentions, staff could not always facilitate the process.

The collection of Barthel and MMSE scores was not routinely in place in these hospitals: in other institutions these are often collected by other members of the multidisciplinary team, such as an occupational therapist assessing people for Barthel score. In future studies, consideration should be given, where this information is not readily available, to methods for collection.

4.2 Residents in geriatric homes and hospitals

The residents in the study had a median age of 82 years for women with a range of 46-102, and 81years for men with a range of 49-101. It can be seen that some of the residents in these units are younger than one might have anticipated in units for older people. However, Blackwell *et al.* reported age distribution and distribution by sex in long-stay geriatric units at end December 1988, and found that 7.6% were aged 40-60 years and 70% were over the age of 75 years (Blackwell *et al.* 1992).

There were more women than men in the cohort, with 61% female in 2000 and 63% in 2002. This not only reflects the lower life expectancy of Irish men, but also a reflection of the all female population in Site D.

4.2.1 Differences between the four sites

Site A is the largest hospital and had 61% female residents in 2000 and 63% in 2002. There were slightly lower numbers of residents with severe dependency than the other sites, with slightly less than half in 2002. The results indicate that there were fewer residents with cognitive impairment in 2002 with the percentage decreasing over time from 90% to 74.3%.

Site B has the highest number of male residents with 41% men in 2000 and 40% in 2002. Again the physical status of the residents is poorer in 2002, having 41.1% with severe dependency in 2000 compared with 57.3% in 2002. The number of residents with cognitive impairment appears to have decreased from 83.3% in 200 to 60.9% in 2002. Despite this, it is interesting to note that this hospital has reconfigured its service to have a secure unit dedicated to the care of residents with dementia.

Site C has a greater percentage of female residents than male, with 70% in 2000 and 65% in 2002. The residents appear to have become appreciably more physically dependent over the period studied, with an increase from 27% to 50.4% of severely dependent residents. Although it appears that their level of cognitive function had improved over time, this may be partly due to the lower number of MMSE assessments successfully completed in 2000. The male residents in this site had not had any experience of answering the question on the MMSE, finding it rather childish and patronising and some preferred not to participate in the MMSE at that time. The increased number of MMSE forms completed the second time may be due to the introduction of regular assessment, prompted by the appointment of a new Consultant Geriatrician.

Site D, as has already been stated, has an all female population. This unit caters for the most highly dependent older women, mainly transferred from the local acute general hospital. This equates with the results of their MMSE and Barthel scores. Nearly all the residents have cognitive impairment with 93.5% in 2000 and 95.5% in 2002. Over two thirds have severe physical disability. The residents here are also slightly older, with a median age of 83 in 2000 and 82 in 2002.

Although on initial selection it would have been expected that the client group in the geriatric homes and hospitals would have been similar, it can be seen that there are significant variations both in the physical dependency levels and prevalence of cognitive impairment of residents between sites. The residents appear to be more dependent in 2002.

There are differences between the four sites in the registered nurse/resident ratios, which have changed over time. However, these figures do not take into account levels of resident dependency and therefore the amount of care needed. Neither do they include the numbers of health care assistants, ancillary staff or other support available. These would have to be considered in future studies, which might consider any relationship between prescribing patterns and staff/resident ratios.

The four units differ in other ways including the size and infrastructure of the hospital, admission policies, management structures, access to pharmacy services, and access to different members of the interdisciplinary team and other clinical experts. These may be factors to be considered in future studies.

4.2.2 Prescribing patterns in geriatric homes/hospitals

The majority of residents in the long-stay units were prescribed medication. 95.9% of residents were prescribed medicines in 2000 and 96.9% in 2002. In 2000 the residents

received a median number of 10 medicines with a range from 1-27 (IQR 8, 14). In 2002 the numbers of prescriptions had increased with a median number of 12 medicines, range from 1-29 (IQR 9, 15).

A recent publication by Clarke and McCormack (2003) identified a cohort of 76 patients in a long-term care setting in Dublin, and reported an average of 9.2 medications per patient. Paired data was available on 52 patients at baseline and again at six months and showed no change numerically. However, these patients were resident in two long-stay units attached to an acute general hospital, and had a full medical team available. A recent study by Fahy *et al.* (2003) of 172 nursing home residents in Bristol found a mean (SD) of 5.8 current drugs prescribed. Nolan and O'Malley (1999) reported a mean of 4.3 drugs per patient (range 1-14) in their study of 301 nursing home residents in the Dublin area in 1989. O'Grady and Weedle (1998) found that of 115 residents in nursing homes in the Cork area in 1998 were receiving 4.1 medicines (range 0-13). However, this study excluded all short-term medications including antibiotics. Also in the Cork area, Sheehan *et al.* (1996) found that patients had on average 3.3 medicines on admission and 2.7 medicines on discharge from their acute geriatric unit. Doona *et al.* (1996) reported an average of 6.1 drugs per patient (range 1-12) in a long-stay unit. This short report published in 1996 relates to one of the hospitals included in this study and is therefore of particular interest. Cunney *et al.* (2003) undertook a survey of prescription monitoring in an acute general hospital, and found an average number of 5.47 prescriptions in a general medical ward (range 0-13). Although this is not a long-term setting it is a larger study with 427 medical prescriptions written, for what would be a predominantly older group of

Irish patients. From this it can be seen that the residents in this study received on average both more medicines per person and with a wider range than reported in previous studies.

Most of the residents in the four long-stay units were receiving five or more drugs, which has been termed as major polypharmacy (Linjakumpu *et al.* 2002). In 2000, 0.4% of residents were prescribed ≤1 drug and in 2000 the number was marginally less at ≤0.2%. In 2000 3.75% received 2-4 drugs and in 2002 this was slightly less at 2.9%.

The number of residents in 2000 receiving 5 or more drugs was 95.9% and had increased over time to 96.9% in 2002. Nolan and O'Malley (1999) reported 41% of patients receiving five drugs or more in nursing homes. They also noted differences between the different nursing homes. O'Grady and Weedle (1998) found the majority (64.4%) of their patients received less than five drugs in their study.

4.2.3 Special considerations in prescribing for older people

As has previously been reported (see literature search) residents in long-stay institutions are at increased risk of polypharmacy. Although they may be viewed as simplistic, Oborne *et al.* (1997) suggested that the number of items prescribed per patient are an important component of clinical audit.

The large number of medications being administered to the residents raises many issues. Polypharmacy is associated with many problems in the older person including poor compliance, cascade prescribing, prescribing errors and increased risk of adverse reactions and drug-drug interactions and other problems associated with the changed physiology of old age (Gupta *et al.* 1996, Hanlon *et al.* 2002). It also increases the risk of medication error. There is also an increased risk with polypharmacy of poor compliance with older people who self-medicate, especially in the community.

There are physical difficulties associated with taking large amounts of drugs, often exacerbated among frail older people who often take fewer fluids (Heath and Webster, 1999). They may be unable to help themselves to drinks, and have to rely on others for assistance. Swallowing multiple pills can be difficult and lead to choking. Oesophagitis may develop when pills are not washed down with sufficient amounts of fluids (Watson, 2000). Some residents may have to have their pills crushed because they are too hard to swallow.

Conversely, the use of many medications may indicate an active approach to the treatment of the older person (Pitkala, Strandberg and Tilvis, 2001). It is therefore important to evaluate the nature of the medication being prescribed, for example the treatment of cardiovascular disease, and value the quality of prescribing rather than the amount. Although consensus panels have been working towards definitive lists of drugs that are appropriate for use in older people, which are already enshrined in legislation in the USA, these are not yet reported in Ireland. However, these have already been used in addition to simple count to evaluate the quality of prescribing.

4.2.4 Prescribing practices compared between sites

There was a great deal of variation in prescribing patterns between sites. Residents in Site C received more drugs in 2000 than other sites, with a median of 15 (IQR 11.75, 18), compared to a median of 10 (IQR 8,12) in Site A, a median of 9 in Site B (IQR 7,12) and a median of 9 in Site D (IQR 7,11). The use of medicines has increased in all sites increased over time. The largest amount of medication prescribed in 2002 remains that of Site C with a median of 16 (IQR 13,20) a significant increase over time ($p<0.007$). This may be related to the increase in the numbers of residents with severe physical dependency. However, the increases are also statistically significant in both Site A ($p<0.0003$) and Site D ($p<0.0012$) between 2000 and 2002. There appears some relationship between the decrease in prescribing rates in Site A, and the improved status of residents as reflected by the change in their Barthel and MMSE scores over time. However, the residents in Site D remain very similar as regards age, physical dependency and cognitive impairment, therefore the increase in prescribing would appear to be attributable to other factors.

The amount of PRN prescriptions has remained fairly similar over time, with 65.3% residents receiving only regular drugs in 2000 and 61.4% in 2002. Clarke and McCormack (2003) found that of the average of 9.2 medications per patients in their study, 5.5 were scheduled and 3.7 were of the PRN type. They found a rise in the number of PRN medicines over time, without any rise in the total number of medicines ordered.

This study was examining the impact of regular consultant review and showed similar findings with regard to PRN prescribing in nursing homes as Wayne *et al.* (1992).

4.3 Nursing time spent in the administration of medicines in long-stay care

The results of timing the nursing staff involvement in drug administration were 13.4 minutes per resident per day. This compared to 11.5 minutes in the Cheltenham study (1983), which was the seminal work in assessing nursing workload. However, the Cheltenham study did not calculate the individual number of medications the patients received. Nursing workload assessments measure all aspects of an activity over a two-week period. The total number of residents on each ward is divided by the number of occasions the resident required the intervention, to calculate a 'proportion'. This 'proportion' is then multiplied by the amount of time to give medicines, to calculate the total number of nurse minutes required per patient for this activity. However, this cannot be viewed in isolation, as residents of different dependency require different levels of assistance. Therefore, further studies would need to be undertaken in this area to assess the real nursing manpower implications of the time taken in the administration of medicines. The large number of medicines prescribed heavily influences the absolute time spent in drug administration rounds. Given that the nursing staff undertake many non-nursing aspects of drug administration that need review, such as ordering pharmacy stores, any changes to decrease this time will need to be implemented by management reorganisation.

4.4 Costs of medication in long-stay units

There was a statistically significant increase in the total median drug cost for residents, which was €9.78 in 2000, and €11.85 in 2002 ($p<0.0001$). The range of costs in 2000 was €22.7-73.14, and in 2002 was €0.12-189.24. This shows that although there is a small increase per resident over the 18-month period, there are both cheaper drugs and more expensive drugs being prescribed, O'Grady and Wheedle (1998) reported an average cost per nursing home resident of 62.5 pence, but their residents were only receiving on average 4.1 drugs. It is difficult to make meaningful comparisons with other studies where less drugs are prescribed.

4.4.1 Gender and drug prescribing in older people

There was little difference in the costs between males and females. In 2000, female residents cost a median of €9.82 per person and the males cost €9.57. In 2002 the relationship remains similar, at €11.75 per female and €11.94 per male resident. It has been reported that women are at the most risk of poor prescribing practices. Recently, Williams, Bennett and Feely (2003) identified elderly community dwelling women in Ireland as being less likely to be prescribed secondary therapies for ischaemic heart disease. It is also reported that women are more likely to need certain drugs, such as laxatives, than men (Lembo and Camilleri, 2003). Therefore, it might be expected that there would be a cost component to the prescribing practices in these facilities by gender,

which is not borne out by these findings. as no gender inequalities have been found in this study.

4.4.2 Comparison of prescribing costs by sites

There was a difference between sites for median cost per resident between all sites over time. In 2000, Site A had the most expenditure per resident with a median of €11.54 and Site D the least with a median of €7.10. In 2002, the pattern has changed: Site C now has by far the most expenditure with a median of €18.64 per residents, and Site B the least with a median of €8.25. There is almost a reversal of the expenditure per resident between the sites: two sites have increased their spending and the other two have decreased in cost but overall costs increased.

Site A had reduced expenditure from €11.54 in 2000 to €9.40 in 2002, a reduction of €2.14, but this is not statistically significant ($p<0.360$). However, the range had altered from 0.23-52.55 in 2000 to 0.12-189.24 in 2002. This means that the medical officer is prescribing both cheaper and more expensive medicines. This change is prescribing may relate to a change in the status of the resident population, who appear to be less dependent both physically and psychologically.

Site B has also reduced the expenditure from €10.55 in 2000 to €8.25 in 2002, a reduction of €2.30 over time ($p<0.024$). The range of medicines has changed from 0.23-52.55 in

2000 to 0.72-45.77 in 2002. There has been an increase at the lower end of the scale, suggesting that there are less numbers of cheaper drugs being prescribed. Again, the reduced expenditure may relate to the change in dependency of the residents.

Site C has increased the median cost per resident from €11.06 in 2000 to €18.64 in 2002 ($p<0.0001$) and increase of €7.58 per resident. This means that the median cost per resident is now twice that of Site B. The range has changed from 2.15-55.94 in 2000 to 2.87-189.24 in 2002. This shows that the residents are receiving more expensive drugs in 2002: the threshold for cheaper drugs is also higher. The physical dependency is Site C has increased over time, which may relate to the increase in costs.

Site D also has increased median drugs from €7.10 in 2000 to €11.87 in 2002 ($p<0.0001$). The range has also changed from 0.81-73.14 in 2000 to 0.55-83.83 over time. This shows a decrease in the lower end of the range of costs. However, the residents in Site D have remained similar in dependency over time so the overall increase in costs cannot be attributed to a change in dependency.

4.4.3 Increased cost of medical preparations

The list of the most expensive drugs in 2000 and 2002 has changed over time, with only four drugs in both lists. It can be seen from the top twenty costs of medication between 2000 and 2002 that some of the high costs can be attributed to the introduction of new

and more expensive drugs. The top cost is now Prostap injection (leuprorelin acetate) at €163.01, a drug used to treat prostate cancer, which despite being prescribed to only 5 residents has a direct effect on the higher end of the price range in two of the sites.

The introduction of a cost for oxygen may be attributed to it being written up on the prescription charts following this being introduced in the new drug guidelines document for safety reasons.

Creams, ointment, gels and unusual products such as Regain (for hair restoration) may be some of the unexpected costs for the sites as some of these are quite expensive. In addition, once they are ordered and opened they may only be used for an individual resident. However, the examples on this list are prescribed for very specific reasons, and cheaper alternatives are not available. Antibiotics injections appear on both the 2000 and 2002 lists. They are expensive, but are only used for few residents when they are seriously ill, or when they are indicated by microbiology results.

Pneumovax is found in the 2002 list. It was not in use in 2000 in these units, and has only been administered to 20 residents in 2002, compared to 141 influenza vaccines. Coles, Balzano and Morse (1992) also reported evidence that nursing home residents are not immunised. It will be interesting to note whether or not its use will increase in the future.

The results show no evidence that residents in the long-stay units are at any disadvantage where their clinical condition indicates the use an expensive medication.

4.5 Comparison between drug prescribing for residents in long-stay units and community-dwelling older people

It can be seen that the residents in the long-stay units receive significantly more medication, and at greater expense, than those living at home. It can be assumed that older people who have been placed in extended care facilities will be more dependent (Stewart *et al.* 1994), and have higher levels of morbidity with a concomitant increase in medication use. This is also reflected in the results within the units, where residents with poorer physical and cognitive function receive more prescriptions.

Although the number of drugs prescribed in the long-stay units is twice that of the community, it can be seen that when PRN drugs are excluded, the numbers of drugs becomes less disparate, with the institutionalised older people receiving a mean of 7 drugs compared with 5.6 in the community. Older people in the community may not be compliant in taking their medication (Cole *et al.* 1990), so they may be consuming fewer drugs than the figures indicate: the residents are given their drugs and supervised in taking them. People in the community also have access to OTC medicines, so they may be taking other medication that has not been prescribed (f *et al.* 2003).

Only 2 residents in the four long-stay units were taking a single drug compared to 287 community dwelling older people. This may be a reflection of better health or may indicate under-treatment of some conditions. When considering the results for five or more drugs, it can be seen that twice the number of residents are taking this number of

drugs (94.8%), compared to 47% of community dwelling people. Again, this may be due to more careful monitoring of residents by qualified staff, and subsequent medical review.

The cost differences between the two groups are very different, with a much higher cost of mean €188.56 in the extended care facilities and €56.88 in the community. Again, this probably reflects the higher dependency of the residents in the long-stay units, and the high use of CNS medication in this group (Oborne *et al.* 2002). However, this does not mean that community dwelling older people necessarily avoid inappropriate medication (Wright *et al.* 1994). The mean cost per prescription is also higher in long-stay, but this may be a reflection of the general practitioners awareness of resource limitations in their own practice. Visiting general practitioners to the long-stay unit do not have budgetary responsibility, and may prescribe medication without constraints.

4.6 Commonly prescribed drugs and the quality of prescribing practice

The most commonly drug identified in both 2000 and 2002 is paracetamol with 57% of residents having a prescription for this drug. This analgesic is cheap, efficacious and recommended for use in older people, having relatively few side effects when compared with aspirin or other NSAIDs (BNF, 2003). The next most commonly prescribed drug is temazepam, although there are 40 fewer prescriptions in 2002 than previously. This reflects a trend in three of the sites for less use of hypnotics over time. Although the decrease in diazepam over time is clear, with 136 less prescriptions over time, it can also be seen that diazemuls injections are now widely prescribed with 141 prescriptions. As this comes in injection form, it may be assumed that these are PRN prescriptions. There is also an increase in prochlorperazine and metoclopramide, but these may also be PRN prescriptions. Further analysis of the database would be needed to clarify these issues.

There are still a large number of laxatives commonly prescribed. There is no change in the number of prescriptions for lactulose, but there is an increased amount of milpar from 101 to 117. This may be perceived as an unfortunate finding, as milpar was one of the medications not recommended for older people on the education programme. However, there are now 122 prescriptions for senokot and 72 for microlax enemas, both of which were actively promoted on the education programme.

There is a reduction in the amount of aspirin 75mg from 151 to 136. This is not necessarily a positive finding, as it may mean that residents are now being under-prescribed for diagnoses such as atrial fibrillation. There is also a reduction in aspirin 300mg, from 117 to <70; 87 prescriptions for resprin suppositories are recorded, which are also used as an anti-pyretic. Frusemide prescriptions have reduced by 4 over time, but frusemide combinations are no longer found among the most common drugs.

Thioridizine was prescribed for 96 of the residents in 2000, and is now virtually discontinued in use. It should be noted that the phasing out the use of this drug had already begun before this study, as a result of its potential cardiotoxicity, and therefore this finding cannot be directly attributed to the education programme, which did strongly discourage its use. Distalgesic use has also decreased and this may be a reflection of teaching on the programme.

The use of influenza vaccine has increased from 115 to 141, which is in line with good practice for older people (Howell and Bedford 1998). There is a slight increase in prescriptions for augmentin, which reflects an increase in the use of antibacterials. There is little change in the use of digoxin, which would have been expected. Folic acid has increased in use from 66 prescriptions in 2000 to 83 in 2002. Combivent, which is used in chronic obstructive airway disease, is now one of the top twenty drugs in use, and may be associated with an increase in costs.

4.6.1 Comparison of types of medication prescribed in the long-stay units

In 2000 the breakdown of drugs by ATC classification showed that 37.1% of medicines were related to the central nervous system, which has decreased over time to 34.1% ($p<0.001$). 97.9% of the residents in 2000 were receiving CNS medicines, and 98.6% in 2002. Jencks and Clauser also reported inappropriate prescribing of these drugs in 1991 (Jencks and Clauser 1991). McGrath and Jackson found in their survey of neuroleptic prescribing in residents of nursing homes in Glasgow in 1996 that 88% of residents were receiving neuroleptics (McGrath and Jackson 1996). Mort and Asparu (2002) reported similar inappropriate prescription of psychotropic agents in elderly people in the community. MacDonald *et al.* (2002) estimated levels of cognitive impairment in nursing homes in southeast England with the use of psychotropic drugs, but concluded that there was no evidence that the use of these medicines was excessive. Passmore *et al.* (1996) suggested that geographical differences made it difficult to extrapolate results.

The results show that 20% of drugs were related to the alimentary tract in 2000 and this has increased to 24% in 2002. This is higher than found by Clarke and McCormack (2003) who reported the rate from their study at 16%. However, Fahey *et al.* (2003) reported 39% of the residents in nursing homes taking laxatives a significantly higher amount than their control study of community dwelling elderly.

The results show that 58% of residents received cardiovascular drugs in 2000, which increased to 61% in 2003. Cardiovascular drug accounted for 16% of prescriptions in Clarke and McCormack's study (2003). O'Grady and Weedle reported 17.8% prescribed cardiovascular drugs.

Blood-forming products have decreased with use over time from 55.7% in 2000 to 48.5% in 2002. This appears to be associated with the changing patterns of prescribing aspirin 75mg as illustrated in Figure 3.3.

There is also a change in the prescribing of respiratory medicines from 37.7% in 2000 to 40.7% in 2002. Residents in Site C are more likely to receive these drugs and residents in Site D the least likely. This could be due to the high dependency of the residents in Site D, who may not be able to use inhalers.

It is difficult to interpret the differences in prescribing practices between sites. Site A has begun to use a small number of nutritional supplements, maintained its use of aspirin 75mg over time; increased use of laxatives and slightly increased use of antipsychotics and anxiolytics, antiasthmatics and cardiovascular drugs, while slightly decreasing respiratory drugs overall. Despite decreasing costs as described above, Site B had increased drug usage in most areas except aspirin 75mg, antipsychotics, hypnotics and cardiovascular drugs. Site C has increased usage in all the drugs except aspirin 75mg and antibacterials. Site D has decreased the use of aspirin 75mg, antibacterials, paracetamol,

CNS medicines, hypnotics, and antidepressants but increased use of antiasthmatics, laxatives, aspirin 300mg and nutritional supplements, NSAIDS very slightly and anxiolytics.

4.6.2 Prescribing patterns and levels of physical and cognitive function and dependency levels

In 2000 residents with MMSE scores <23 were more likely to receive aspirin 300mg and anxiolytics. In 2002 they were more likely to receive laxatives, antibacterials, paracetamol, antipsychotics, anxiolytics and hypnotics.

It could be argued that the patterns of prescribing have become more appropriate over time (Gale and Oakley-Browne, 2002). Antipsychotics therapies were being used 'off licence' to alleviate some of the behavioural disturbances found in this group of residents with cognitive impairment. Recent guidelines issued by the Irish Medicines Board (IMB 2004) highlights the increased risk of cerebrovascular adverse events in elderly people with dementia treated with atypical antipsychotics. It does not authorise the use of olanzapine for the treatment of dementia-related psychosis, and restricts the use of risperidone to people with severe symptoms with symptoms such as aggressiveness, activity disturbances or psychotic symptoms which may lead to the person suffering disability, potential danger or self harm. It will be important to evaluate future prescription chart audits to monitor the restricted use of these drugs.

In the case of residents with poor cognitive function, it could be argued that it would be very important to ensure that residents who cannot communicate are assessed for pain levels and treated accordingly. Stein *et al.* (2001) have suggested that the evaluation of the effects of interventions, particularly effects on pain and function, is sometimes problematic because of cognitive impairment or difficulties in comprehension. Therefore, the widespread prescribing of paracetamol could be promoted as a marker of good quality prescribing in older people, with an associated reduction in the use of NSAIDs with their associated risk factors (BMJ, 2003).

The association between Barthel scores and medication is also difficult to assess. It is apparent that different medicines are prescribed according to whether the resident is physically disabled or independent. There are obvious clinically related markers for review in these results, such as an expected increased use of laxatives in bed-bound residents. However, this is not borne out by the results, where independent residents are receiving far more laxatives than previously. It could therefore be due to an improvement in formal prescribing practices following the introduction of the drug administration guidelines, i.e., in 2000 many laxatives were given to residents but not prescribed or recorded. In 2002 such use is now recorded.

Independent residents are receiving far more aspirin 300mg than other residents and their uptake of NSAIDs has increased. They also receive more anxiolytics than other residents. This may be due to better diagnosis as they may be more obviously exhibiting signs and symptoms, or able to give a better history to the nursing or medical staff.

Dependent residents are receiving more hypnotics, but this has decreased slightly over time. This may be associated with an increase in knowledge levels among the staff about their side effects, and therefore the willingness to us non-pharmacological interventions. This is an area that would warrant further study.

4.6.3 Use of psychotropic medication in the older person

Most of the residents in the four hospitals are receiving medications, which affect the central nervous system. Geriatric homes and hospitals were not designed for the long-term care of older people with mental health problems, and this leads to many operational difficulties and shortcomings on a day-to-day basis (Bartels *et al.* 2003). They do not have registered psychiatric nurses who have been trained to care for people with behavioural problems. However, many of the residents have poor levels of cognitive function, as measured by a score<23 on the MMSE score (Corey-Bloom 1995). The Action Plan for Dementia published by the National Council on Ageing and Older People published in 1999 (O'Shea and O'Reilly 1999) highlights the current situation for long-stay placement in Ireland. There are few long-stay units for older people, and available estimates suggest that there are significant numbers of people with dementia being cared for in geriatric homes and hospitals (Browne *et al.* 1994). One survey (Blackwell *et al.* 1992) found that 42% of residents had poor mental health, 39% were uncommunicative and 37% were uncooperative. Observing any residents with behavioural or high-risk problems such as epilepsy is difficult in large wards (Timmons *et al.* 2003). The buildings are larger than specialist units, and they do not have access to

therapies such as reminiscence, validation and music therapies, or general diversional therapy. Lack of physical and mental exercise leads to a decline in cognitive function (Laurin *et al.* 2001). Maintaining a safe environment for residents is accepted as the priority of care in the absence of both these specialist services and appropriate staff skills and knowledge. It has been suggested that this may lead to using restraints including pharmacological interventions (O'Mahoney *et al.* 1993, Ryan *et al.* 2002).

The administration of psychotropic drugs is generally cited as a marker for poor quality of care in services for older people, and Lee *et al.* (2004) in their review of randomised controlled trials which have evaluated the use of oral atypical antipsychotics, concluded that further evidence is required to support their use in the management of the behavioural and psychological symptoms of dementia. Any medication that sedates the older person can have far-reaching effects. A drowsy person is at risk from an accident or fall. A fall can have catastrophic results in older people resulting in increased morbidity and mortality (Andalod, 2003, Lawlor *et al.* 2003, Swift 2001). Psychotropic drugs have been associated with both an increased relative risk of falling (Tinetti *et al.* 1994) and an increased risk of hip fracture and other injury. There is evidence that falls are related to taking sedative medication including antidepressants and benzodiazepines (Neutel *et al.* 1996) A recent debate in the British Medical Journal has been concerned with whether or nor the relationship is causative (Pierfitte *et al.* 2001, Byrne 2001a, Moore 2001, Guptha 2001). Psychotropic drugs cause sedation, impaired balance and postural hypotension. Withdrawal of psychotropic drugs has been shown to significantly reduce the risk of falling (Campbell *et al.* 1991, Gillespie *et al.* 1998).

An older person who is drowsy is unlikely to be able to take care of his or her own personal hygiene needs, and, of particular importance, to maintain continence. They will not be able to maintain adequate fluid status and will probably need assistance at mealtimes. Besides physical problems, they will have little or no quality of life. However, not all health care workers feel that these medications are unnecessary. MacDonald *et al.* (2002) estimated the prevalence of dementia and psychotropic medication in nursing homes. They found that as many as 74% had probable dementia, and 38% had cognitive impairment. The study suggested that since many older residents in general as opposed to psychiatric facilities have dementia, and exhibit behavioural disturbances, then the high levels of prescribing of these medicines might not be excessive. Future studies would need to assess the appropriateness of prescribing these medications on individual residents.

Caring for older people is difficult, demanding and stressful work (Ingham and Fielding 1985, Garner and Ardern 1998). It is not always easy to recruit nurses into this sector, and there is a reliance on untrained attendants. Residents whose behaviour is noisy or disruptive, who are wandering and fidgeting may be given medication in an effort to ease the situation (Garner and Evans 2002). Burgener and Barton (1991) identify the importance of explicating research-based nursing management techniques, as high technology and complex medical interventions are often not required. It may be appropriate for future education programmes to address appropriate strategies for caring for residents with behavioural problems.

4.6.4 Clinical depression in older people

Older people appear to be at increased risk from depression than other age groups (Chew-Graham 2004). There is no doubt that 'depressive symptoms' are more common in older people than young adults, and are more likely to be linked to the losses and life events occurring around the time that most people retire. However, the old may recover from mental illness as well as, if not better than the young. It is therefore important for health care workers to understand the signs and symptoms of depression, so that appropriate treatment can be initiated as soon as possible.

Evan suggests that the prevalence of depression in older community dwelling people may be up to 35%, (Evans 1998) and depression is more common in Irish people who are functionally dependent. (Garavan *et al.* 2001) Women seem to be more likely to be depressed, as they get older. Given that the majority of the residents are female, it would seem appropriate to look for a significant level of antidepressant therapy in this client group. It is therefore of concern to see the prescribing rate fall in Site D, which has all female residents. The prevalence of clinical depression of residents in long-stay facilities should have a direct bearing on the prescribing of appropriate antidepressant therapy. Denihan *et al.* (2000) reported a prevalence rate of 10.3% of depression in community-dwelling elderly people in Dublin. They identified 40% of depressed individuals receiving antidepressants. The main types of antidepressants prescribed were serotonin reuptake inhibitors and tricyclic antidepressants. The type of antidepressant therapy is important, as highly anticholinergics antidepressants have more side effects such as dry mouth, blurred vision, constipation, urinary dysfunction, tachycardia and cognitive impairment (van Eijk 2001) Other studies

estimate the prevalence of depression in the elderly at between 9% and 18%, but the real numbers are probably under reported, as older people do not readily reveal depressive symptoms. Recently, depression has been linked to chronic pain complaints and depression (Rosack 2003). Given the high level of analgesia use in the four long-stay facilities, this may be an indicator that more residents should be assessed for potential clinical depression. No depression ratings scores are currently in use in the hospitals.

Having to move into long-stay care is not the first choice of older people in Ireland (Garavan *et al.* 2001). People prefer to stay in their own homes with help from their families and neighbours where possible. A nursing home is a more acceptable long-stay facility than a geriatric hospital with the possibility of having a single room, or sharing with one or two others. There is more emphasis on comfortable, homely surroundings, more diversional therapy and better choice in every day matters such as menus. Long-stay hospitals were formerly 'county homes' and as such not only have a stigma attached to them but also are in isolated areas, sometimes difficult to access by transport for visitors. They are designed on a hospital model, with standard hospital beds and lockers and little opportunity for residents to have their own possessions around them. Facilities are communal and choice is limited. It is to be expected that this is a very stressful experience, in which the person had little choice, sometimes due to the loss of a carer. This may contribute to the older person becoming clinically depressed.

The results show that antidepressant prescribing has increased in three sites over time. This may be due to the increased level of awareness of staff following the education programme. Although there are other methods for treating depression other than pharmacological such as

dynamic psychotherapy and electro-convulsant therapy, these are not available to the residents in the long-stay facilities under study. Further developments in this area would warrant further attention.

4.6.5 Use of laxatives in the older person

Most of the residents in the study are either receiving laxatives daily, or are prescribed them on a PRN basis. This implies that most of the residents in the long-stay units are suffering from chronic constipation. Constipation is a common symptom affecting between 2 percent and 27 percent of the population in western countries (Lembo and Camilleri 2003) It is more prevalent in women than men, and in older people than younger adults. Therefore, the residents in our long-stay units appear to have a very high prevalence of constipation. This suggests that a review of the management of continence might benefit from further review.

Causes of constipation include dietary factors, lack of exercise, medication, underlying medical conditions, neurological disorders, metabolic and endocrine conditions systemic disorders and abuse of laxatives (Christer *et al.* 2003) Medications that are liable to cause constipation include analgesics, especially opioid analgesics, antacids that contain aluminium, antispasmodics, antidepressants, iron supplements, diuretics, and anti-convulsants (Crouch, 2003). Many of the residents in the long-stay units are prescribed one or more of these medicines. Therefore, future audits of the residents' prescription charts could look for an association between these medicines.

The underlying medical and neurological conditions include Parkinson's disease, stroke, diabetes and hypothyroidism, all of which would be found in this group of residents. Therefore, it may be useful to limit the use of laxatives limited within specific protocols.

There are many misconceptions about continence, and there is a common misconception that incontinence is an inevitable consequence of ageing. It is also suggested that older people find it difficult to discuss problems with bowel and bladder functions, and that health professionals may not always be as tactful as they might be about such a sensitive issue (Roe and May 1999). Nursing staff may need further education to update their skills in this area.

Although older people may need more assistance with elimination, it is important for their self-esteem and quality of life that they are helped to maintain continence. There are many reasons that a person who has been recently admitted to long-stay care may have difficulties with elimination, due to change of environment and routine, and lack of privacy. For the ambulant people in these hospital wards, which were built in the days when the majority of patients were nursed in bed, the toilet facilities may be inadequate. Often there are too few toilets or those available are too far away to be readily reached; many are too small for wheelchairs or walking frames; and some are too cold for comfort, or so public that they deny any real privacy. (Roper *et al.* 1990) These issues may be areas that need consideration in agreeing the annual service plan and seeking increased resources.

The hospital diet may not include enough fibre for the older person, with processed bread, and other foods served that may be unsuitable for residents. It is also more difficult to maintain adequate fluid intake than at home. One of the units had taken steps to address this

and installed cooled water dispensers in all wards and day rooms. This is also the site with a reduction in drug usage over time.

Most new admission to the long-stay facilities have spent some time as an in-patient in a general hospital, and may have been commenced on laxatives at that time. It may be possible to introduce a policy of re-assessment on admission to the long-stay units.

Nurses play a key role is assessing the causes of constipation, and should be taking non-pharmacological steps where possible to prevent rather than treat the problem. Most people think that medication is the only solution, but the regular use of an aperient leads to reliance, because the bowel muscle loses its natural tone. A recent audit of chronic constipation in the community (Addison *et al.* 2003) which included people in nursing or residential homes, reported just under half those surveyed were chronically constipated despite taking regular laxatives.

Most osmotic laxatives such as lactulose, which is widely prescribed for these residents, take several days to work. Stimulant laxatives such as senokot work within hours but may cause abdominal cramps; this is particularly unpleasant for immobile people. Although the medical officer writes the prescription, it is the nurse who administers them, and is responsible for evaluating and documenting their efficacy. Some nursing staff were trained in the tradition of administering daily aperients to all their patients, and routinely distribute laxatives during the drug administration round. There are problems associated with disseminating research evidence to nurses from which to base their clinical practice. Williams, Chrichton and Roe

(1997) describe a programme designed to overcome this problem, in relation to continence care, but reported a 50% drop our rate by nurses of all grades.

There is a cost implication associated with this large amount of potentially unnecessary medication. The aperients may not be expensive *per se,* but the large amount being used mount up on the pharmacy budget. They also take time to administer. However, the most important resource implication is in the manpower hours saved by promoting continence in older people (Flint and Sinclair 1996). Natural remedies such as prune juice, apricot and fig mixture and linseed oil leave the resident at less risk from side effects, helping to maintain their dignity and quality of life.

4.6.6 Managing sleep disorders in the older person

Many residents in the four sites are prescribed hypnotics, but there is a marked difference in prescribing practices between sites. Prescribing levels have reduced over time in two sites, stayed almost identical in one site and increased in the other. In Site D 84.1% of residents were prescribed a hypnotic, and over three quarters were still prescribed one in 2002. This reflects a heavy reliance on pharmacological methods to ensure that residents get their nights sleep. Prescribing has changed over time with reference to the level of cognitive impairment of residents. In 2002 residents with an MMSE score of $\geq$23 were significantly more likely to be prescribed a hypnotic. This may relate to residents who may be wandering, noisy or disruptive. There is also a trend towards residents with more severe physical dependency to be prescribed a hypnotic.

Many people have trouble sleeping, and older people have more sleep problems. A review by the Mayo Clinic of Sleep Disorders in the Elderly (2003) reported that more than 50% of community dwelling individuals over 65 have problems with sleeping, as well as an estimated two thirds of institutionalised older people. There are many different factors that affect this level of reporting, including emotional distress such as bereavement. Since admission to a long-stay care facility is often associated with catastrophic events such as a stroke, diminishing mental capacity, or the loss of a carer, it is to be expected that this client group would be at increased risk from insomnia. Sleep is also affected by other factors such as physiological changes associated with the ageing process, adverse effects of medications, and potentially serious underlying medical conditions.

It had not been usual practice in the long-stay units under study to assess sleep problems in any detail. Sleep patterns are now one of the activities of daily living that are assessed as part of the nursing process (Salvage and Kershaw 1990). This is the system of assessing all residents individually when they are admitted, so that a care plan can be agreed and written down. It has been suggested that these care plans can improve quality of care (McKenna 1993). It can therefore be seen that managing the residents sleep is an integral part of nursing care. Any change in the approach to residents who have problems sleeping should be led by the nursing staff who are with the residents both day and night.

Sleep changes with ageing. More time is needed to fall asleep, and where this is not taken into consideration, residents may seem to be in need of some help. Maintaining sleep is more difficult as there may be many reasons why an older person will have a more

disturbed night. A number of physical conditions may cause wakening including needing to get up and use the lavatory, and gastroesophageal reflux exacerbated when the person lies down. This may lead to drowsiness during the day and it can be seen on the wards that many of the residents are napping during the day. This is a vicious circle with the residents having less sleep efficiency as a result.

There are pharmacological causes of insomnia. Some medicines make falling asleep difficult, while others such as diuretics may cause nocturnal wakening. Alcohol, corticosteroids, thyroxine, neuroleptics and certain antidepressant medications, particularly selective serotonin reuptake inhibitors may all cause insomnia in older people. In addition, other medications such as benzodiazepines are often used to induce sleep but may paradoxically cause agitation and insomnia in older people (DoHC 2002).

Residents with dementia often have severe sleep disturbance, which may be seen as a problem for other residents more than the individual. They may be prescribed hypnotics to ensure that they will not disturb the ward, which unfortunately means medication that can further impair cognition.

It has long been known in services for older people that sleeping tablets have a risk of addiction and cause a morning hangover. It has been suggested that there is a vested interest by both medical staff and night nursing staff in keeping their patients quiet at night (Bayer and Pathy 1985). Bayer and Pathy (1985) found that a third of older in-patients requested sleeping tablets, but some were satisfied without a prescription, and others slept well following administration of a placebo. There are also unrealistic

expectations about the amount of sleep older people can achieve. In the long-stay units residents are put to bed very early, and most residents in the study were observed to be in bed by 7 o'clock. Night sedation is administered at 9 pm. This led to the reporting by nursing staff during their interviews that they often wake residents up to administer sleeping pills.

It is difficult to justify the widespread use of sleeping tablets in this client group (Reynolds *et al.* 1985). Nearly all the residents have spent considerable time in a general hospital prior to admission, and hypnotics are widely prescribed (Griffith and Robinson 1996). It may have become routine to continue this practice, as the medical officer may be reluctant to arbitrarily change a regimen that has been originally supervised by a consultant geriatrician.

There are many non-pharmacological interventions for insomnia. It has been suggested that physical exercise taken regularly may promote relaxation and raise core body temperature in ways that are beneficial to initiating and maintaining sleep (Montgomery and Dennis 2003, Alessi *et al*). It is possible that if residents were less drowsy in the mornings they would need less help with their ADLs.

A project related to the use of aromatherapy with older people in Tullamore General Hospital reported a reduction of 49% in the use of night sedation (Cannard 1995, Cannard, 1997). Other simple measures include not enforcing early bed times for residents, ensuring they are warm and dry, are not hungry and have a milky drink before bed.

4.6.7 Pain control and the older person

Pain can have a very negative effect on the quality of life for older residents, as it not only affects the person's ability to function, but has an impact on psychological and spiritual aspects of their already limited social environment. Pain can be viewed as either acute or chronic. Most acute pain is a limited episode, which will be resolved by analgesic medication or other easily defined interventions. Chronic pain is a debilitating and persistent phenomenon, which is usually defined as lasting more than 3 months. In the older person it may be due to muscle or joint pain, causalgia, neuralgia, phantom pain, vascular pain, diabetic pain, terminal cancer pain and central post-stroke pain. Older people with problems such as shingles or stroke may also experience altered sensation known as hyperalgesia, which is a heightened response to a stimulus. Since each of these presents differently, managing the individual's pain may be seen as a complex matter.

There are a number of misconceptions that are associated with pain in old age, and many people believe that pain is an inevitable feature of old age. This has the potential to lead to difficulties with nursing staff, who may feel it is a feature of everyday life for older people (Heath and Webster 1999). Some residents, who are unable to articulate themselves, may exhibit pain in other ways such as facial expression or elevated blood pressure. They may be restless and unable to settle comfortably or, conversely, they may be reluctant to mobilise. It is recommended that future studies should include formal pain assessment tools, which are another form of ratings tools, to facilitate residents and staff to have a commonality of understanding.

It is usual in these long-stay facilities to have analgesia prescribed on the residents prescription charts on a PRN basis. Staff usually start at the bottom of the so-called 'analgesic ladder' and give the mildest medicine to achieve pain relief. They would begin with aspirin, paracetamol or a non-steroidal anti-inflammatory drug such as ibuprofen, naproxen and diclofenac. Although aspirin is indicated for headache, transient muscoskeletal pain and pyrexia and is useful for everyday problems, it is not usually prescribed in inflammatory conditions because it is a gastric irritant, and mostly another NSAID will be prescribed (BNF 2003). Paracetamol is similar in efficacy to aspirin, but has no demonstrable anti-inflammatory activity; it is less irritant to the stomach than aspirin and this may be reflected in the popularity of paracetamol in this study. Co-proxamol is another drug in use which was more commonly used in the long-stay units in 2000 than 2002. Co-proxamol has been shown to be no more effective than paracetamol, and is not recommended as first line treatment for older people (Beers 1997). Since most of the residents have a prescription for analgesics, the use of an appropriate medication could be utilised in future audits as a marker of good quality prescribing.

There are non-pharmacological interventions for the relief of pain, and although this seems to be an appealing option, there needs to be more research undertaken in this area to ascertain their efficacy (Sindhu 1996). Heath and Webster (1999) and Wood (2003) suggest the use of transcutaneous electrical nerve stimulation (TENS), where small electrode pads are applied to the residents skin, which emit a mild electric current over the pain area from a small box. The older person can mobilise with the box in their pocket. There is no limit to the length of time that the device can be used for, and this may be used instead of some or all medication. Other non-pharmacological interventions

include measures such as heat pads, hydrotherapy, massage, acupuncture and reflexology. Some of these interventions may be more acceptable to the residents than others, who may not be familiar with all of these treatments.

4.7 Medication error

Iatrogenic injuries are a potentially avoidable source of morbidity and mortality. It has been suggested that prescribing errors occur in 0.4-1.9% of all medication orders written (Dean 2000). The levels of illegible prescription in this study would suggest that drug prescription charts might be a common cause of potential error in these long-stay facilities. The first attempt to read the prescription charts resulted in missing data of >5% due to illegibility. This was subsequently reduced with the help of the nursing staff. Cunney *et al.* (2003) reported similar rates in their study in an acute general hospital in Dublin. However, in the general hospital there would be less possibility of being familiar with the medical officers handwriting than in the long-stay units. It could be surmised that the level of legibility may be poorer than the results reported in the long-stay units, and that new or temporary staff may be at increased risk from misreading a prescription in these settings.

The possibility for medication error will also increase with large amount of drugs being administered. The results show that staff may have to be familiar with up to 448 different medical preparations, which will make it difficult for staff to keep up-to-date with the drugs and possible adverse reactions. Therefore, the poor standard of prescription charts, coupled with complicated prescription patterns, is an area that would merit further examination.

There are safety implications where drug administration rounds take a long time such as in these units; most residents need assistance with taking their medication, and other residents may disrupt the round breaking the nurse's concentration: fatigue may also cause problems

(Alberti 2002). The policy in Ireland is for a single nurse to administer medicines, the exception being controlled drugs: in services for older people, with all the difficulties described above, this may increase the possibility of error, and therefore further research in this area would be recommended.

A formalised system for reviewing drug charts by Consultant staff is accepted as good practice in hospitals. In services for older people this should be an interdisciplinary review, with both nursing and paramedical staff given the opportunity for input. This allows discussion of how the medication is affecting the resident's progress, their psychological status and their competence with activities of daily living. Checking drug charts by a pharmacist is also standard both in hospital and now in the community, where their interventions have prevented many errors (Dean 2000). The pharmacist is able to offer advice on different aspects of the medicines prescribed, including appropriate doseage, potential interactions, and different preparations of the drug available (Hudson and Boyter, 1997b, Sommerville 1997). These arrangements offer systems of quality assurance that are not available in the long-stay facilities (DoH, 2000). Future developments should include the need for improved pharmacy services for the long-stay units.

4.8 The changing role of the nurse in the administration of medicines

The role of the nurse in long-stay geriatric hospitals is different to that in other services for older people elsewhere, where they are members of a multidisciplinary team and where therapeutic nursing may play a pivotal role (Steiner 2001). Pincombe *et al.* (1996) found in their study of critical aspects of nursing in aged and extended care:

"Although they had a very sound knowledge of [resident], what they didn't have was a lot of theoretical knowledge and the confidence to articulate that. I found that...nurses had a vague notion that medications or treatments weren't quite appropriate but didn't know how to articulate that, couldn't actually talk about the half life or absorption of drugs. They certainly didn't have understanding of the gate theory of pain control."

A recent report *Nurses' and Midwives' Understanding and Experiences of Empowerment in Ireland* (DoHC 2003) suggests there is some ambiguity in the attitude of nurses to medical colleagues. Nurses ranked having the skills to carry out their role, being accountable for practice, being adequately educated to perform their role, being an advocate for clients/patients, being able to say no when they judged it to be necessary, and being recognised as a professional by the medical profession as the things that were "crucial to empowerment". All these factors are necessary for the nurse to play a full and active role in medicines management for a vulnerable population such as the residents in these long-stay facilities. This is necessary both for good quality prescribing and administration to take place. The medical officer is usually a part-time general

practitioner who spends very little time in the unit. There are large numbers of residents, many of who have complex medical problems, and most of who are poor historians. The doctor has to rely on the nursing staff to speak on behalf of the resident, giving an accurate history, reporting observations and interventions carried out, and using baseline measurements to record changes in condition. The nursing staff must ensure that their perceptions are congruent with that of the resident where possible, because that may not necessarily be the case (Redfern and Norman 1999). The nurse also needs to have a thorough knowledge of the medicines that each resident receives in order to monitor its efficacy, potential side effects and adverse reactions. It should be expected that non-pharmacological intervention have been tried in the first instance where appropriate: Richman (2004) reminds us of their importance, since all drugs can have serious side effects. The effective care of older people depends very much upon nurses and care assistants who form the key workforce involved in their 24-hour care. As such their beliefs and values can have a significant influence upon all aspects of care delivered, and upon those they work with. Previous evidence suggested that nurses are as guilty as others in demonstrating negative attitudes toward older people (Wade 1999), which may influence their attitudes towards the use of medication such as sedation. However, the results of this study may indicate that, as a result of updating their skills and knowledge relating to the administration of medicines, nurses can play a role in the reduction of medication use. Meador *et al.* (1997) also found that education programmes that included both medical and nursing staff reduced the use of antipsychotics in nursing homes. Future programmes should take cognisance of these findings.

4.8.1 The Drug Update programme

The drug update programme for nurses had some limitations, mainly due to the large numbers of staff to be included, as reported elsewhere (Lagerlov *et al.* 2000). The course also had to be applicable for staff at all levels of experience and knowledge. The short duration of the course would merit review in future, as expert speakers, who were given a specific remit, found that they also had to respond to wider areas of concern. Some of the issues raised were controversial, and participants wanted to use the study days as a forum for discussion.

Meador *et al.* (1997) implemented a shorter education programme for all staff, including nursing attendants, involved in direct patient care, in order to facilitate the reduction of antipsychotic medication. Future studies may need to consider the scale of the project, and focus on specific medication, especially those over which the nursing staff may have the most influence in their administration.

4.9 Summary of the Results

The following results and conclusions relate to the five aims of the study:

1. Comparison of prescribing practices between the four long-stay institutions for older people

- The results showed there were clear differences in prescribing patterns between the four sites. In all the sites, the drug chart audit showed that the residents were prescribed more medication than reported in other studies in long-stay care. The median number of drugs, and the range of drugs, has increased in all sites over time.

- Since PRN prescribing was found to be common practice, PRN drugs were excluded in secondary analysis, which subsequently reduced the total level of polypharmacy. The median number of all drugs, with PRNs excluded, remains the same over time. When PRN drugs were excluded, the median number of drugs in Site B decreased slightly over time over time. The use of PRN prescribing appears to be related to the restricted medical cover, so that, in day-to-day clinical practice, the team try to anticipate which drugs the residents may need between doctors visits. PRN prescribing may also be necessary in the long-stay units because of the unavailability of OTC medicines to residents, since access to all medicines is under the charge of the nursing staff.

- Prescribing patterns appear to differ according to the level of physical disability and cognitive function of residents. There appears to be less symptomatic prescribing such as laxatives, hypnotics, antibacterials, sedatives and antipsychotics and more therapeutic prescribing such as aspirin for the less cognitively impaired. It is difficult to draw definite conclusions from the findings, as the pattern of prescribing related to resident assessment differs between sites, and may be confounded by other factors.

2. Introduction of guidelines for the safe administration of medicines in tandem with an educational programme for nursing staff

- Guidelines for the safe administration of medicines were introduced, following a recognised process, which involved wide consultation. Staff used the consultative process to express their views about the administration of medicines to the long-stay residents. Although this proved very time-consuming, and therefore resource intensive, it resulted in a more equitable approach to policy formation.

- All nursing staff undertook the two-day drug update programme, which was certified by An Bord Altranais. However, a follow-up day was deemed necessary to fulfil all the programme objectives.

- Following the introduction of the guidelines and the completion of the education programme, prescribing patterns changed, with more medicines prescribed. Some

of these changes may be due to the introduction of the new policy, i.e. in 2000 many laxatives were given but not prescribed, whereas in 2002 such use is now recorded.

- The changes in prescribing patterns were different between sites, although staff had equal access to all the information about the quality assurance programme, and had undertaken identical educational input.

- There was a change in the types of the medicines in use over time. Some of the medication such as hypnotics, which had been identified as not recommended for older people on the drug update programme, have been reduced or discontinued. This may be associated with the increased level of knowledge among the nursing staff, who play a key role in communicating the residents needs to medical staff.

3. Comparison of prescribing practices following the interventions, with particular reference to those drugs which have been identified as having implications for the quality of life for older people.

- Some of the medications in use have been identified by expert panels as not recommended for use in older people. However, some of the changes in prescribing over time indicate a gradual change in the use of medicines such as sedatives, in keeping with guidelines for good practice in older people.

- There were marked difference between the sites with the prescribing of those medicines identified in the literature as related to the quality of prescribing, including antipsychotics, antidepressants, laxatives, hypnotics, analgesics, NSAIDs and aspirin.

- Since some very expensive drugs were prescribed for the long-stay residents, cost does not appear to be a factor in the quality of prescribing practice.

4. To compare medication costs before and after the interventions

- The median costs of all medication had increased over time from €9.78 in 2000 to €11.85 in 2002.

- The costs have changed in all four sites over time. However, while the costs in Site A and Site B have decreased, the costs in Site C and Site D have both significantly increased.

- Some new drugs available in 2002 were found to be very expensive.

5. Comparison of prescribing patterns among the older residents in long-term care institutions with a similar cohort of older people matched by gender and age, and resident in the community

- Long-stay residents were prescribed more medication than the control group in the community. There are some limitations in interpreting these results, as the elderly not receiving medications on the GMS were not included on the database from which the control group were matched. Another consideration is that the study does not reflect the use of OTC medicines by older people in the community.

- There was no evidence of under-treatment of conditions, although there different medicines were prescribed in the long-stay units compared with community dwelling older people. Residents received more medicines related to the alimentary tract, blood forming products, anti-infectives and the central nervous system: community dwelling older people received more drugs related to the cardiovascular system.

- Both the mean cost per person, and the mean cost per prescription, was higher in the long-stay residents compared to the community dwelling older people.

4.10 Recommendation for future studies

There is evidently scope for further consideration in the area of medicines management for older people. The next step might be to agree limited formularies, which exclude inappropriate medicines for frail elderly people, and are in line with other widely accepted initiatives (Beers 1997). The use of medicines could then be monitored to assess the effect on the residents' physical and cognitive status.

In their large, retrospective cohort study to determine the extent of potentially inappropriate outpatient prescribing for elderly people in the United States, Curtis *et al.* (2004) reported the common use of potentially inappropriate drugs. In an accompanying editorial, Knight Steel (2004) wrote that this study is evidence of:

"....a significant failure in the American health care system. Although the drugs included on such a list may vary depending on the views of the members of the panel, if even half that number of elderly subjects is taking potentially inappropriate medications, one in ten of all older persons are receiving a drug that is potentially not appropriate."

This underlines the need for further research and innovation in this area.

The design of future studies should take into account some of the limitations inherent in geriatric homes and hospitals. It would be important to include the opinion of the residents and their families where possible, and look for measures of quality of life

associated with prescribing practice. There is the potential for working in partnership in future studies with units elsewhere in Ireland and further afield.

Further evidence is needed about the impact of introducing policies, protocols and guidelines on clinical practice. The association between education programmes and quality of prescribing also warrants further attention.

Although the introduction of audit into long-stay care has been associated with improvements in the standards of care (Chambers, Knight and Campbell, 1996), it is uncertain whether this is a direct consequence of the audit carried out, or is due to the non-specific effects of an outside assessor visiting the long-stay units. Further work is needed to address this issue.

Although the levels of prescribing has increased over a period of eighteen months, since the patterns of prescribing have changed significantly, future studies may be able to concentrate on the content of the interventions, and evaluate their efficacy in introducing change.

There is a wide variation in prescribing patterns between sites, and future studies would be helpful in ascertaining the reasons why prescribers vary so much in their practice (Watkins *et al.* 2003, Ashworth, Golding and Shephard 2002, Black and Bowman 1997, Lagerlov *et al.* 2000, Majeed and Wrigley 2002).

4.11 Future developments for optimising prescribing practice in older people

The results of the study show that older people who are resident in the four geriatric homes and hospitals under study are at risk from major polypharmacy, which is in keeping with other Irish studies (O'Grady and Weedle, Poston and Parrish 1998, Clarke and McCormack, 2003). (Although providing a policy document for the administration of medicines and an education programme for staff did not succeed in reducing the amount of medicines that the residents in the four sites were prescribed, the results show that prescribing practices have changed and developed over time. It is important to focus on facilitating nursing staff to explore alternative interventions for residents' problems where possible, prior to the introduction of medication, which should lead to a better quality of life for residents.

Different epidemiological scenarios have been described to predict the levels of morbidity and mortality in the ageing population (O'Boyle 1997). First, the average period of morbidity may increase, with a longer life span but the same prevalence of chronic disease. Second, older people may be well for longer as well as living longer, and therefore the period of morbidity during old age may not change. Third, improved medical interventions, changes in lifestyle and the potential improvement in general health for older people may bring a decrease in morbidity. The first two scenarios mean that some, possibly more, older people will still need to be cared for in institutions in the future. Different demographic scenarios will need to be considered when reviewing prescribing practices.

It is expected that future generations with long-term care needs will come from the consumer society, and may have higher expectations for their care provision. Where institutionalised care is necessary, the facility to exercise personal independence is considered to be an important component of nursing care (Pincombe *et al.* 1996). Residents who are subject to poor prescribing practices, whether over or under treatment, and who receive medication which is inappropriate or unnecessary, are often prevented from maintaining the optimum quality of life because of their lack of personal independence.

Recently in the British Medical Journal, Lewis (BMJ, 2004) suggests that general practitioners should follow a simple system of medication review before writing repeat prescriptions. The NO TEARS tool for medication review advocates a system of open questions to elicit need and adverse events, and in addition assessing need, disease control, evidence-base, risk reduction and simplification and switching of medicines. This system may merit implementation and evaluation in the Irish health care system.

The focus of concern to decision makers and health care professionals should be the value derived from drug therapy, rather than simply the level of the drugs bill (Walley and Haycox, 1997). The impact of placing severe constraints on the drugs bill needs to be evaluated, to ensure that it does not lead to significant increased costs elsewhere in the health care system.

REFERENCES

Addison R, Davis C, Haslam *et al.* A national audit of chronic constipation in the community. *Nurs Times* 2003; 99(11): 34-35

Adler BJ and Stott DJ. How far to investigate older people? *Clin Med* 2003; 3(5): 418-422

Adler PA and Adler P. Observational Techniques. In: Handbook of Qualitative Research. Eds: Denzin NK and Lincoln YS. London: 1994, pp. 377-392

Alberti K. Medical Errors: a Common Problem. *Brit Med J* 2002; 322: 501-502

Alessi CA, Yoon EJ, Schnelle JF, *et al.* A randomised trial of a combined physical activity and environmental intervention in nursing home residents: do sleep and agitation improve? *J Am Geriatr Soc* 1999; 47: 784-91

Amoako EP, Richardson-Campbell L, Kennedy-Malone L. Self Medication with over-the-counter drugs among elderly adults. *J Gerontol Nurs* 2003; 29(8): 10-15

An Bord Altranais. *Continuing professional education for nurses in Ireland: A framework.* Dublin: An Bord Altranais, 1997

An Bord Altranais. *The code of professional conduct for each nurse and midwife.* Dublin: An Bord Altranais, 1988

An Bord Altranais. *Guidance to nurses and midwives on the development of policies, guidelines and protocols.* Dublin: An Bord Altranais, 2000

An Bord Altranais. *Guidance to nurses and midwives on medication management.* Dublin: An Bord Altranais, 2003

Andalod D. Medication review aims to reduce falls. *Prescribing and Medicines Management* 2003; 4: 11-13

Aparasu RR and Mort JR. Inappropriate prescribing for the elderly: Beers criteria-based review. *Ann Pharmacother* 2000; 34 (3): 338-346

Ashworth M, Golding S, Majeed A. Prescribing indicators and their use by primary care groups to influence prescribing. *J Clin Pharm Ther* 2000; 27: 197-204

Ashworth M, Golding S, Shephard L *et al.* Prescribing incentive schemes in two NHS regions: cross sectional survey. *Brit Med J* 2002; 324: 1187-1188

Audit Commission. *Forget me Not: Mental Health Services for Older People.* London: Audit Commission 2000

Azad N, Tierney M, Victor G *et al.* Adverse drug events in the elderly population admitted to a tertiary care hospital. *J Healthc Manag* 2002; 47(5): 295-305

Ballard CG, O'Brien JT, Reichelt K *et al.* Aromatherapy as a safe and effective treatment for the management of agitation in severe dementia: the results of a double-blind, placebo-controlled trial with Melissa. *J Clin Psychiatry* 2002; 63: 553-8

Barry M. Drug expenditure in Ireland 1991-2001. *Ir Med J* 2002; 9(10): 1-2

Bartels SJ, Horn SD, Smout RJ *et al.* Agitation and depression in frail nursing home elderly patients with dementia. *Am J Geriatr Psychiatry* 2003; 11 :231-238

Bayer AJ and Pathy MSJ. Request for hypnotic drugs and placebo response in elderly hospital in-patients. *J Postgrad Med* 1985; 61: 317-320

Beard K. Are drugs really toxic for older people? *Expert Opin Drug Saf* 2003; 2(3): 211-3

Becker MH, Stolley PD, Lasagna L *et al.* Different education concerning therapeutics and resultant physician prescribing patterns. *J Med Educ* 1972; 47: 118-127

Beers MH, Ouslander JG, Rollingher I, *et al.* Explicit criteria for determining inappropriate medication in nursing home residents. *Arch Intern Med* 1991; 151: 1825-1832

Beers MH. Explicit criteria for determining inappriopriate medication use by the elderly. *Arch Intern Med* 1997; 157: 1531-1536

Benner P. From novice to expert: Excellence and power in clinical nursing. Menlo Park: Addison Wesley, 1984

Benner P, Tanner, C, Chesla C. Expertise in nursing practice-caring, clinical judgement and ethics. New York: Springer Publishing Co. 1996

Bernabei R, Gambassi G, Lapane K *et al.* Characteristics of the SAGE database: a new resource for research on outcomes in long-term care. SAGE (Systematic Assessment of Geriatric drug use via Epidemiology) Study Group. *J Gerontol A Biol Sci Med Sci* 1999; 54(1): M25-33

Bernhaut J and Mackay K. Extended nursing roles in intermediate care: a cost-benefit evaluation. *Nurs Times* 2002; 98(21): 37-39

Bjerrum L, Sogaard J, Hallas J *et al.* Polypharmacy: correlations with sex, age and drug regimen. *Eur J Clin Pharmacol* 1998; 54: 197-202

Bjerrum L, Sogaard J, Hallas J *et al.* Polypharmacy in general practice: differences between practitioners. *Brit J Gen Pract* 1999; 49: 195-198

Black D and Bowman C. Community institutional care for frail elderly people. Time to structure professional responsibility. *Brit Med J* 1997; 315: 441-442

Blackwell J, O'Shea E, Moane G, and Murray P, (Eds). *Care and provision cost measurement: Dependent elderly people at home and in geriatric hospitals.* Dublin: The Economic and Social Research Institute, 1992, pp. 23-51

Bochner F, Burgess NG and Dean Martin E. Approaches to rationing drugs in hospitals. *Pharmacoeconomics* 1996; 10(5); 467-474

Bootman JL, Harrison DL, Cox E. The health care cost of drug-related morbidity and mortality in nursing facilities. *Arch Intern Med* 1997; 157: 2089-2096

British National Formulary. No 44. British Medical Association and Royal Pharmacuetical Society of Great Britain. London: BMA, 2003

Brodaty H, Harris L, Peters K *et al.* Prognosis of depression in the elderly. A comparison with younger patients. *Br J Psychiatry* 1993; 163: 589-596

Brooks N, Otway C, Rashid C *et al.* The patient's view: the benefits and limitations of nurse prescribing. *Br J Community Nurs* 2001; 6(7): 342-348

Browne JP, O'Boyle CA, McGee HM *et al.* Individual quality of life in the healthy elderly. *Quality Life Res* 1994; 3: 235-244

Buetow SA, Sibbald B, Cantrill JA *et al.* Prevalence of potentially inappropriate long term prescribing in general practice in the United Kingdom, 1980-1995: systematic literature review. *Brit Med J* 1996; 313: 1371-1374

Burgener SC and Barton D. Nursing care of the cognitively impaired institutionalized elderly. *J Gerontol Nurs* 1991; 17(4): 37-43

Byrne A. Safety of benzodiazepines not supported by data on hip fractures. *Brit Med J* 2001a; 322: 704

Byrne A. Benzodiazepines often cause more harm than good – now beyond reasonable doubt. *Brit Med J* 2001b; 323: 752

Campbell AJ, Robertson MC, Gardner MM *et al.* Psychotropic medication withdrawal and a home-based exercise programme to prevent falls: a randomised control trial. *J Am Geriatr Soc* 1999; 47: 850-853

Cannard G. The emergence of a Nursing Development Unit in the Republic of Ireland – Developments at Tullamore. *Eur Nurs* 1997; 2(4): 229-233

Cannard G. Complementary therapies: On the scent of a good night sleep. *Nurs Stand* 1995; 9(34): 21

Carbonin P, Pahor M, Bernabei R *et al.* Is age an independent risk factor of adverse drug reactions in hospitalised medical patients? *J Am Geriatr Soc* 1991; 39: 1093-1099

Central Statistics Office, *Irish life tables, No.13, (1995-7).* Dublin: Stationary Office, 2001

Chambers R, Knight F, Campbell I. A pilot study of the introduction of audit into nursing homes. *Age Ageing* 1996; 25: 465-469

Cheltenham and District Health Authority. *A step-by-step guide to undertaking a nursing dependency study in a hospital for elderly people. Non-clinical research report.* Cheltenham: CDHA, 1983

Chew-Graham C, Baldwin R, Burns A. Treating depression in later life. *Brit Med J* 2004; 329: 181-182

Christer R, Robinson L, Bird C. Constipation: causes and cures. *Nurs Times* 2003; 99(25): 26-28

Chu LW and Pei CKW. Risk factors for early emergency hospital readmission in elderly medical patients. *Gerontol* 1999; 45: 220-226

Clark P and Bowling A. Observational study of quality of life in NHS nursing homes and a long-stay ward for the elderly. *Ageing and Society* 1989; 9: 123-148

Clarke B and McCormack P. Prescribing practices in an Irish long-term care setting. *Ir Med J* 2003; 96(7): 203-207

Closs SJ. Pain and elderly patients: a survey of nurses, knowledge and experiences. *J Adv Nurs* 1996; 23(2): 237-242

Cockburn J and Pit S. Prescribing behaviour in clinical practice: patients' expectations and doctors' perceptions of patients' expectations – a questionnaire study. *Brit Med J* 1997; 315: 520-523

Cohen-Mansfield J and Billigs N. Agitated behaviours in the elderly: a conceptual review. *J Am Geriatr Soc* 1998; 36: 7-12

Coles SB, Balzano and Morse. An outbreak of influenza A in a well immunised nursing home population. *J Am Geriatr Soc* 1992; 40: 589-592

Col N, Fanale JE, Kronholm P. The role of medication non-compliance and adverse drug reactions in hospitalisations of the elderly. *Arch Intern Med 1990*; 150: 841-845

Collin C, Wade DT, Davies S *et al.* The Barthel ADL Index: a reliability study. *Int Disabil Stud* 1988; 10: 61-63

Consumer Association. Local drug formularies – are they worth the effort? Drugs and Therapeutics Bulletin 1989; 27(4): 13-16

Consumer Association. Constructing a practice formulary: a learning exercise. Drugs and Therapeutics Bulletin 1991; 29(7): 25-26

Consumer Association. Drugs for disruptive features in dementia. Drugs and Therapeutics Bulletin 2003; 41 (1) 1-4

Corey-Bloom J, Thal LJ, Galasko D *et al.* Diagnosis and evaluation of dementia. *Neurology* 1995; 45: 211-218

Covinsky KE, Palmer RM, Fortinsky RH *et al.* Loss of independence in activities of daily living in older adults hospitalized with medical illnesses: increased vulnerability with age. *J Am Geriatr Soc* 2003; 51: 451-458

Cowal CE, Kagen-Fishkind JE, Sherlin M *et al.* An educational model to introduce staff nurses to continuous quality improvement/total quality management concepts. *J Nurs Staff Devel* 1997; 13(3): 144-148

Cowan D, While A, Roberts J *et al.* Medicines management in care homes for older people: the nurse's role. *Br J Community Nurs* 2002; 7(12): 634-638

Crouch D. Easing the pain of constipation. *Nurs Times* 2003; 99(11): 23-25

Crome P. What's different about older people? *Toxicol* 2003; 192: 49-54

Cunney A, Williams D, Feely J. Prescription monitoring in an Irish hospital. *Ir Med J* 2003; 96(1): 20-22

Curtis LH, Ostbye T, Sendersky V *et al.* Inappropriate prescribing for elderly Americans in a large outpatient population. *Arch Intern Med* 2004; 164: 1621-1625

Cutts C and Tett SE. Influences on doctor' prescribing: is geographical remoteness a factor? *Aust J Rural Health* 2003; 11: 124-130

Davis, DA. and Taylor-Vaisey A. A systematic review of theoretical concepts, practical experience and research evidence in the adoption of clinical practice guidelines. *Can Med Assoc J* 1997; 157(4): 408-416

Dean B, Barber N, Schachter, M. What is prescribing error? *Int J Qual Health Care* 2000; 9(4): 232-237

Dean G and Mulvihill CJ. The Registration of Births and Deaths in Ireland. *J Ir Med Assoc* 1972; 65: 5

Dean G and McLoughlin H. The Registration and Certification of Deaths in the West of Ireland: A Follow-up Study. *J Ir Med Assoc* 1980; 73: 7

Delafuente JC. Understanding and preventing drug interactions in the elderly. *Crit Rev Oncol Hematol* 2003; 48(2): 133-143

Delaney T. *Medication Use in Hospital – Risky Business!* Irish Healthcare Risk Management Association: IRHA 2002.

Denihan A, Kirby M, Bruce I *et al.* Three-year prognosis of depression in the community-dwelling elderly. *Br J Psychiatry* 2000; 176: 453-457

Department of Health. *The Years Ahead: A policy for the elderly. Report of working group on the services for the elderly.* Dublin: The Stationary Office, 1988

Department of Health. *Report on the Advisory Group on Nurse Prescribing. (Crown Report).* London: HMSO, 1989

Department of Health. *An organisation with a memory: Report of an expert group on learning from adverse events in the NHS.* London: HMSO, 2000

Department of Health. *Care Homes for Older People: National Minimum Standards.* London: HMSO, 2003

Department of Health. *National Service Framework for Older People.* London: HMSO, 2001

Department of Health. *Building a safer NHS for patients: improving medication safety.* London: HMSO, 2004

Department of Health and Children. *Shaping a healthier future: A strategy for effective health care in the 1990's.* Dublin: The Stationary Office, 1994

Department of Health and Children. *Commission on nursing – interim report.* Dublin: Stationary Office, 1997

Department of Health and Children. *Report of the Commission on Nursing. A blueprint for the future.* Dublin: Stationary Office 1998

Department of Health and Children, *Information Management Unit. Health statistics 1999.* Dublin: The Stationary Office, 1999

Department of Health and Children. *Annual report of the Chief Medical Officer 1999.* Dublin: Stationary Office, 2000a

Department of Health and Children. *The National Health Promotion Council Strategy, 2000-2005.* Dublin: The Stationary Office, 2000b

Department of Health and Children. *Quality and fairness. A health system for you.* Dublin: Stationary Office, 2001a

Department of Health and Children. *Primary care: A new direction.* Dublin: Stationary Office, 2001b

Department of Health and Children. *Report of the Benzodiazepine Committee.* Dublin: Stationary Office, 2002a

Department of Health and Children. *Long-Stay Activity Statistics.* Dublin: Stationary Office, 2002b

Department of Health and Children. *Nurses' and midwives' understanding and experiences of empowerment in Ireland.* Dublin: Stationary Office, 2003

Department of Social and Family Affairs. *Study to examine the future financing of long-term care in Ireland.* Dublin: The Stationary Office, 2002

Diguiseppi C. Why everyone over thee age of 65 deserves influenza vaccine. *Brit Med J* 1996; 313: 1162

Doona SM, McGettigan P, Feely J *et al.* Drug prescribing in a long-stay unit. *Ir J Med Sci* 1996; 165: 14

Drummond, MF, Stoddart GL, Torrance GW. *Methods for the economic evaluation of health care programmes.* Oxford: Oxford Medical Publications, 1990

Dunea, G. Views and reviews, soundings, mistakes. *Brit Med J* 1998; 316: 1026

Earl-Slater A. The elderly, medicines and robust evidence from randomised control trials. *J Clin Effect* 1998; 3 (3): 105-111

Eastern Health Board. *10 Year action plan for services for older people 1999-2008.* Dublin: EHB, 1998

Eccles M, Mason J, Freemantle N. Developing cost-effective guidelines: A methodological report from the North of England Evidence Based Guideline Development Project. *Int J Qual Health Care* 2000; 9: 127-132

Elon RD. Recent advances: geriatric medicine. *Brit Med J* 1996; 312: 561-563

Evans S. Beyond the mirror: a group analytic exploration of late life and depression. *Aging and Mental Health* 1998; 2(2): 94-99

Evans S and Katona C. The epidemiology of depressive symptoms in elderly primary care attenders. *Dementia* 1193; 4: 327-333

Fahey T and Murray P. *Health and Autonomy among the over-65s in Ireland. Report No 39.* Dublin: National Council for the Elderly, 1994

Fahey T. *Health and social care: Implications of population ageing in Ireland.* National Council for the Elderly, Report No. 42. Dublin: Oak Tree Press, 1996

Fahey, T. and Fitz Gerald J. *Welfare implications of demographic trends.* Dunlin: Oak Tree Press in association with the Combat Poverty Agency, 1997

Fahey, T. *Population Ageing, the Elderly and Health Care.* In: The Irish Health Care System in the 21st Century. Leahy A and Wiley MM, Eds. Dublin: Oak Tree Press, 1998, pp 183-198

Fahey T, Montgomery AA, Barnes J *et al.* Quality of care for elderly residents in nursing homes and elderly people living at home: controlled observational study. *Brit Med J* 2003; 326: 580-583

Feely J. Generic prescribing – can we achieve a balance? *Ir Med J* 1986; 79(9): 241-242

Ferrow L *et al.* The Grampian Joint General Practice/Hospital Formulary – An Update. *The Pharmaceutical Journal* 1997; 257: 124-125

Flint H and Sinclair H. An economic evaluation of a nursing development unit. *Europ Nurse* 1996; 1(2): 86-92

Flint H. In: *A compendium of key issues for the nurses in the Eastern Health Board.* Dublin: Eastern Health Board, 2000

Folstein MF, Folstein SE, McHugh PR. Mini-Mental State: a practical method for grading the cognitive state of patients for the clinician. *J Psychiat Res* 1975; 12:189-198

Furniss L, Burns A, Craig SKL *et al.* Effects of a pharmacist's medication review in nursing home: Randomised controlled trial. *Br J Psychiatry* 2000; 176: 563-567

Gale C and Oakley Browne M. Anxiety disorder. *Brit Med J* 2000: 321: 1204-1207

Garavan R,, Winder R, McGee HM, Eds. *Health and Social Services for Older People (HeSSOP). Consulting older people on health and social services: A survey of service use, experiences and needs.* National Council on Ageing and Older People, Report No. 64. Dublin: Oak Tree Press, 2001

Garner J and Ardern M. Reflections on old age. *Aging and Mental Health* 1998; 2(2): 92-93

Garner J and Evans S. An ethical perspective on institutional abuse on older adults. *Psych Bull* 2002; 26: 164-166

Gilbert A, Owen N, Innes JM *et al.* Trial of an intervention to reduce chronic benzodiazepine use among residents of aged-care facilities. *Aust N Z J Med* 1993; 23: 343-7

Gillespie LD, Gillespie WJ, Cumming R *et al.* Interventions to reduce the incidence of falling in the elderly. *The Cochrane Library* 1998; issue 2: 1-33

Gillick MR and Mendes ML. Medical Care in Old Age: What Do Nurses in Long-term Care Consider Appropriate? *J Am Geriatr Soc* 1996; 44: 1322-1325

Goff S. *Pain and comfort.* In: Healthy ageing. Heath H and Schofield I. Trento: Harcourt Publishers, 1999, pp. 227-248

Greengold NL, Shane R, Schneider P *et al.* The impact of dedicated medication nurses on the medication administration error rate: a randomised controlled trial. *Arch Intern Med* 2003; 163: 2359-66

Griffith DN and Robinson M. Prescribing practice and policy for hypnotics; a model of pharmacy audit. *Age Ageing* 1996; 25(6): 490-492

Gupta A. General perception of stroke. *Brit Med J* 2002; 325: 392

Gupta S, Rappaport M, Harvey M *et al.* Inappropriate drug prescribing and related outcomes for elderly Medicaid beneficiaries residing in nursing homes. *Clin Therapeut* 1996; 18(1): 183-196

Guptha SH. Duration of exposure to benzodiazepine should have been sought to improve validity of the study. *Brit Med J* 2001; 322: 704

Hall M, McCormack P, Arthurs N *et al.* The spontaneous reporting of adverse drug reactions by nurses. *Br J Clin Pharmacol* 1995; 40(2): 173-5

Hanlon JT, Schmader JE and Samsa GP. A method for assessing drug therapy appropriateness. *J Clin Epidemiol* 1992; 45: 1045-1051

Hanlon JT, Schmader KE, Boult C *et al.* Use of inappropriate prescription drugs by older people. *J Am Geriatr Soc* 2002; 50: 26-34

Hanlon JT, Fillenbaum GG, Kuchibhatla M *et al.* Impact of appropriate drug use on mortality and functional status in representative community dwelling elders. *Med Care* 2002; 40(2): 166-176

Hanlon JT, Artz MB, Pieper CF *et al.* Inappropriate Medication Use Among Frail Elderly Inpatients. *Ann Pharmacother* 2004; 38: 9-14

Hartikainen S, Rahkonen T, Kautiainen H *et al.* Use of psychotropics among home-dwelling nondemented and demented elderly. *Int J Geriatr Psychiatry* 2003; 18: 1135-1141

Health Advisory Service 2000 *"Not Because They Are Old". An independent inquiry into the care of older people on acute wards in general hospitals.* Woking: HAS2000, 1998. pp 39-40

Heath H and Webster C. *Pharmacology and Mediciations.* In: Healthy ageing. Heath H and Schofield I. Trento: Harcourt Publishers, 1999, pp 227-248

Heath I. A wolf in sheep's clothing: a critical look at the ethics of drug taking. *Brit Med J* 2003; 327: 856-858

Heft, MW and Mariotti AJ. Geriatric pharmacology. *Dent Clin N Am* 2002; 46: 869-885

Hemminki E. Review of literature on the prescribing factor affecting drug prescribing. *Soc. Sci & Med* 1975; 9: 111-115

Herings RMC. Benzodiazepines do increase the risk of hip fracture. *Brit Med J* 2001; 322: 704

Hohl CM, Dankoff J, Colacone A *et al.* Polypharmacy, adverse drug-related events, and potential adverse drug interactions in elderly patients presenting to an emergency department. *Ann Emerg Med* 2001; 38(6): 666-71

Horrocks S, Anderson E, Salisbury C. Systematic review of whether nurse practitioners working in primary care can provide equivalent care to doctors. *Brit Med J* 2002; 324: 819-823

Howell F and Bedford D. Influenza vaccine and the older person. *Ir Med J* 1998; 91(4): 1-3

Hudson SA and Boyter AC. Pharmaceutical care of the elderly. *Pharaceut J* 1997a; 259: 686-688

Hudson SA and Boyter AC. The pharmacist's approach to medication in the older patient. *Pharaceut J* 1997b; 259:689-690

Hunt JM and Gjoka G. Nurse reporting of adverse events caused by medicines. *Nurs Times* 2003; 99(49): 24-25

Iliffe S, Haines A, Gallivan S *et al.* Assessment of elderly people in general practice. Functional abilities and medical problems. *Br J Gen Pract* 1991; 41(342): 13-15

Ingham R and Fielding P. A review of the nursing literature on attitudes towards old people. *Int J Nurs Stud* 1985; 22(3): 171-181

Irish Medicines Board. *Drug Safety* 2004; 19: 3-4

Jencks, SF and Clauser SB. Managing behaviour problems in nursing homes. *J Am Med Assoc* 1991; 265(4): 502-503

Johnson AG, Quinn DI and Day RO. Non-steroidal anti-inflammatory drugs. *Med J Aust* 1995; 163(3): 155-158

Johnson JA and Bootman JL. Pharmacoeconomic analysis in formulary decisions: An international perspective. *Am J Hosp Pharm* 1994; 51: 2593-2598

Jones RW. The dementias. *Clin Med* 2003; 3(5): 404-408

Joshi MP, Williams A and Petrie JC. Hospital formularies in 1993: Where, why and how? *J Pharm* 1994; 253: 63-65

Katona CL, Hunter BN, Bray J. A double-blind comparison of the efficacy and safety of paroxetin and imipramine in the treatment of depression with dementia. *Int J Geriatr Psychiatry* 1998; 13: 100-108

Katz S and Akpom CA. A measure of primary sociobiological functions. *Int J Health Serv* 1976; 6: 493-507

Kavanagh S and Knapp M. The impact on general practitioners of the changing balance of care for elderly people living in institutions. *Brit Med J* 1998; 317: 322-327

Kayser-Jones J. Decision Making in the Treatment of Acute Illness in Nursing Homes: Framing the Decision Problem, Treatment Plan, and Outcome. *Med Anthropol Q* 1995; 9(2): 236-256

Keogh F and Roche A. *Mental health disorders in older Irish people: incidence, prevalence and treatment*. Dublin: National Council for the Elderly, 1996

Khunti K and Kinsella B. Effect of systematic review of medication by general practitioners on drug consumption among nursing home residents. *Age Ageing* 2000; 29: 451-453

King D and Morgan R. Giving influenza to all elderly people would raise ethical issues. *Brit Med J* 1997; 314: 373

Klarin I, Fastbom J and Wimo A. A population-based study of drug use in the very old living in a rural district of Sweden, with focus on cardiovascular drug consumption: comparison with an urban cohort. *Pharmacoepidemiol Drug Saf* 2003; 12(8): 669-78

Koopmans RT, van der Borgh JP, Bor JH *et al.* Increase in drug use after admission to Dutch nursing homes. *Pharm World Sci* 2003; 25(1): 30-34

Krska J, Cromarty JA, Arris F *et al.* Pharmacist-led medication review in patients over 65: a randomized, controlled trial in primary care. *Age Ageing* 2001; 30: 205-211

Lagerlov P, Loeb M, Andrew M *et al.* Improving doctors' prescribing behaviour through refection on guidelines and prescription feedback: A randomised controlled study. *Int J Qual Health Care* 2000; 9: 159-165

Larsen PD and Hoot Martin JL. Polypharmacy and elderly patients. *AORN J* 1999; 69(3): 619-628

Lassila HC, Stoehr GP, Ganguli M *et al.* Use of prescription medications in an elderly rural population: the MoVIES Project. *Ann Pharmacother* 1996; 30(6): 589-95

Latter S, Rycroft-Malone J, Yerrell P *et al.* Evaluating educational preparation for a health care educational role in practice: A case of medication education. *J Adv Nurs* 2000; 32(5): 1285-1290

Laurin D, Verreault R, Lindsay J *et al.* Physical activity and risk of cognitive impairment and dementia in elderly persons. *Arch Neurol* 2001; 58: 498-504

Lawlor DA, Patel R, Ebrahim S. Association between falls in elderly women and chronic diseases and drug use: cross sectional study. *Brit Med J* 2003; 327: 712-717

Layte R, Fahey T, Whelan, C. *Income, Deprivation and Well-Being Among Older Irish People.* Dublin: National Council on Ageing and Older People, 1999

Leahy AL and Wiley MM., Eds. *The Irish health care system in the 21st century* . Dublin: Oak Tree Press, 1998

Leape L. Reporting medical errors: time for reality check. *Int J Qual Health Care* 2000; 9(4): 144-145

Lee PE, Gill SS, Freedman M *et al.* Atypical antipsychotic drugs in the treatment of behavioural and psychological symptoms of dementia: systematic review. *Brit Med J* 2004;

Lembo A and Camilleri M. Chronic constipation. *N Engl J Med* 2003; 349(14): 1360-1368

Levy R. Costs and benefits of pharmaceutical: the value equation for older Americans. *Care Manag J* 2002; 3(3): 135-142

Lindley CM, Tully MP, Paramsorthy V *et al.* Inappropriate medication is a major cause of adverse drug reactions in elderly patients. *Age Ageing* 1992; 21: 294-300

Linjakumpu T. Hartikainen S. Klaukka T *et al.* Use of medications and polypharmacy are increasing among the elderly. *J Clin Epidemiol* 2002; 55: 809-817

Linne AB and Liedholm H. Audit of prescribing practices in nursing homes. Many preparations but few serious interactions. *Lakartidningen* 2003; 100 (28-29): 2360-2365

Liu GG and Christensen DB. The continuing challenge of inappropriate prescribing in the elderly: an update of the evidence. *J Am Pharm Assoc* 2002;42: 847-857

Luker K, Austin L, Hogg C *et al. Evaluation of Nurse Prescribing: Final Report.* The University of Liverpool and The University of York (1997b)

Lyketsos CG, Lindell Veiel L, Baker A *et al.* A randomized, controlled trial of bright light therapy for agitated behaviours in dementia patients residing in long-term care. *Int J Geriatr Psychiatry* 1999; 14: 520-5

MacDonald AJD, Carpenter GI, Box O *et al.* Dementia and use of psychotropic medication in non – "Elderly Mentally Infirm" nursing home in south east England. *Age Ageing* 2002; 31: 58-64

Mahoney FI, Wood OH, Barthel DW. Rehabilitation of chronically ill patients: the influence of complications on the final goal. *South Med J* 1958; 51: 605-609

Mahoney FI and Barthel DW. Functional evaluation: the Barthel Index. *Maryland State Med J* 1965; 14: 61-65

Mayo Clinic. Sleep Disorders in the Elderly. *Geriatr Med* 2003; www.mayo.edu

Majeed A, Evans N, Head P. What can PACT tell us about prescribing in general practice? *Brit Med J* 1997; 315: 1515-1519

Majeed A and Wrigley T. Antibiotic prescribing rates in England are falling. *Brit Med J* 2002; 325: 340

Mamun K, Lien CTC, Goh-Tan CYE *et al.* Polypharmacy and inappropriate medication use in singapore nursing homes. *Ann Acad Med Singapore* 2004; 33: 49-52

Manias E, and Street A. Legitimisation of nurses' knowledge through policies and protocols in clinical practice. *J Adv Nurs* 2000; 32(6): 1467-1475

Mannesse CK, Derkx FHM, de Ridder MAJ *et al.* Contribution of adverse drug reactions to hospital admission of older patients. *Age Ageing* 2000; 29: 35-39

Masoudi FA and Crumholz HM. Polypharmacy and comorbidity in heart failure. *Brit Med J* 2003; 327: 513-514

Mayor S. Report calls for strategies to reduce medication errors. *Brit Med J* 2004; 328: 248

McDowell I and Newell C. *Measuring Health. A guide to ratings scales and questionnaires.* 2nd edition. Oxford: Oxford University Press, 1996

McGrath AM and Jackson GA. Survey of neuroleptic prescribing in residents of nursing homes in Glasgow. *Brit Med J* 1996; 312: 611-612

McKenna H. The effects of nursing models on quality of care. *Nurs Times* 1993; 89(33): 43-46

McGowan B, Heery A, Ryan M *et al.* Cost of treating heart failure in an Irish teaching hospital. *Ir J Med Sci* 2001; 169(4): 241-244

McClean AJ and Le Couteur DG. Aging biology and geriatric clinical pharmacology. *Pharmacol Rev* 2004; 56 (2): 163-208

McLeod PJ, Huang AR, Tamblyn RM *et al.* Defining inappropriate practices in prescribing for elderly people: a national consensus panel. *Can Med Assoc J* 1997; 156 (3): 385-391

McShane R, Keene J, Gedling K *et al.* Do neuroleptic drugs hasten cognitive decline in dementia? Prospective study with necropsy follow up. *Brit Med J* 1997; 314: 266

Meador KG, Taylor JA, Purushottam BT *et al.* Predictors of antipsychotic withdrawal or dose reduction in a randomised controlled trial of provider education. *J Am Geriatr Soc* 1997; 45: 207-210

Miller WL and Crabtree BF. Clinical Research. In: *Handbook of Qualitative Research* Eds: Denzin NK and Lincoln YS. London: 1994

MIMS. *Monthly Index of Medical Specialities*, London: MIMS, 2003

Minister for Health. *The nursing homes (care and welfare) regulations.* Dublin: Stationary Office; 1993

Misner BD. Consequences of drug, dose and risk for medical error. *Brit Med J* 2002; 324: 1113-1118

Montgomery P and Dennis J. Physical exercise for sleep problems in adults aged 60+ (Cochrane review). *The Cochrane Library* Issue 3. Oxford: 2003

Moore N. Author's reply to criticism of study on benzodiazepines and risk of hip fracture. *Brit Med J* 2001; 323: 752

Moriarty J. Planning care for people with dementia. *Working with Older People* 2001: 16-20

Mort JR and Aparasu RR. Prescribing potentially inappropriate psychotropic medications to the ambulatory elderly. *Arch Intern Med* 2000; 160: 2825-2831

Godlove Mozely C, Challis D, Sutcliffe C *et al.* Psychiatric symptomatology in elderly people admitted to nursing and residential care homes. *Ageing & Mental Health* 2000; 4(2): 136-141

Muller C. The Overmedicated Society: Forces in the marketplace for Medical Care. *Science* 1972; 16: 488-492

Mulrow C, Lau J, Cornell J *et al.* Pharmacotherapy for hypertension in the elderly. *The Cochrane Library* issue 3. Oxford: 2003

Murtaugh CM and Freiman MP. Nursing Home Residents at Risk of Hospitalisation and the Characteristics of Their Hospital Stays. *Gerontologist* 1995; 35(1): 35-43

Murray MD and Callahan CM. Improving Medication Use for Older Adults: An Integrated Research Agenda. *Ann Intern Med* 2004; 139 (5): 425-434

National Council on Ageing and Older People. *Adding years to life and life to years. A health promotion strategy for older people.* Dublin: NCAOP, 1988

National Council on Ageing and Older People. *The cost of caring for people with dementia and related cognitive impairments.* Dublin: NCAOP, 2000

National Council on Ageing and Older People. *Return immigration. Ageing in Ireland. Fact File No. 12.* Dublin: NCAOP, 2001

National Council on Ageing and Older People. *Long stay care. Ageing in Ireland. Fact File No. 7.* Dublin: NCAOP, 2001

National Council on Ageing and Older People. *Protecting Our Future: Report of the Working Group on Elder Abuse* September 2002. Report No. 73. NCAOP, 2002

National Council for the Elderly. *Health service implications of population ageing in Ireland, 1991-2011.* Dublin: NCE, 1995

National Institute for Clinical Excellence. Guidance on the use of donepezil, rivastigmine and galantamine for the treatment of Alzheimer's disease. Technology Appraisal Guidance No 19. London: NICE, 2001. www.nice.org.uk

National Medicines Information Centre. *Prescribing in the elderly.* Volume 3, No 1. Dublin: NMIC, 2000

National Medicines Information Centre. *Prescribing in the elderly.* Volume 6, No 1. Dublin: NMIC, 2000

National Medicines Information Centre. *Introduction to clinical research and critical appraisal.* Volume 9, No 5. Dublin: NMIC, 2003

Nayeem K and O'Keefe ST. Delirium. *Clin Med* 2003; 3(5): 412-415

Neutel CI, Hirdes JP, Maxwell CJ *et al.* New evidence on benzodiazepine use and falls: the time factor. *Age Ageing* 1996; 25: 273-278

Nobili A, Tettamanti M, Frattura L *et al.* Drug use by the elderly in Italy. *Ann Pharmacotherapy* 1997; 31(4): 416-22

Nolan L and O'Malley K. The need for a more rational approach to drug prescribing for elderly people in nursing homes. *Age Ageing* 1989; 18: 52-56

NUD.IST *User Manual.* Qualitative Solutions and Research, Labtrobe University, Victoria: 1993

Nygaard HA, Naik M, Ruths S *et al.* Nursing home residents and their drug use: a comparison between mentally intact and mentally impaired residents. The Bergen district nursing home (BEDNURS) study. *Eur J Clin Pharmacol* 2003; 59: 463-469

Oborne CA, Batty GM, Maskrey V, *et al.* Development of prescribing indicators for elderly medical in-patients. *Br J Clin Pharmacol* 1997a; 43: 91-97

Oborne CA, Batty GM, Jackson SHD. Prescription monitoring for elderly patients: applying the evidence for appropriate prescribing. *Pharmaceut J* 1997b; 259: 691-692

Oborne CA, Hooper R, Li KC *et al.* An indicator of appropriate neuroleptic prescribing in nursing homes. *Age Ageing* 2002; 31(6): 435-439

Oborne CA, Hooper R, Swift CJ *et al.* Explicit, evidence-based criteria to assess the quality of prescribing to elderly nursing home residents. *Age Ageing* 2003; 32(1): 102-108

O'Boyle C. Measuring the quality of later life. *Phil Trans R Soc Lond* 1997; 352:1871-1879

O'Grady M and Weedle P. A descriptive study of drug therapy and cost for elderly residents in a nursing home. *Ir Med J* 1998; 91: 172-174

O'Mahoney D, O'Boyle C, Joyce CRB, *et al.* Measuring the quality of life of dementia patients using the schedule for the evaluation of individual quality of life. *Ir J Psychiatry* 1993; 14(1): 154-163

O'Neill D, Condren L, O'Kelly F, *et al.* Cognitive impairment in the elderly. *Ir Med J* 1988; 81(1): 11-13

O'Neill D, O'Shea B, Walsh JB, *et al.* Screening for dementia and delirium using an adapted Folstein Mini-Mental Sate Examination. *Ir Med J* 1989; 82(1): 24-25

O'Neill, D. Dementia and Depression in a Nursing Home Population. In: O'Neill D. Ed. *Carers, Professionals and Alzheimer's Disease*. Dublin: John Libbey, 1991

O'Shea, E. and O'Reilly, S. *An action plan for dementia. National Council on Ageing and Older People. Report No. 54.* Dublin: NCAOP, 1999.

Passmore AP, Crawford VL, Berringer TR *et al.* Neuroleptic prescribing in residents of nursing homes. Geographical differences make extrapolation difficult. *Brit Med J* 1996; 312: 611-612

Paterniti S, Verdier-Taillefer M-H, Dufouil C, *et al.* Depressive symptoms and cognitive decline in elderly people: a longtitudinal study. *Br J Psychiatry* 2002; 181: 406-410

Peate I. Medicines and the older person: principles of good practice. *Br J Nurs 2003;* 12(9): 530-5

Penninx BWJH, Guralnik JM, Ferrucci L *et al.* Deficiency and depression in physically disabled older women: epidemiologic evidence from the woman's health and ageing study. *Am J Psychiatry* 2000; 157(5): 715-721

Petticrew M, Watt I, Sheldon T. *Systematic review of the effectiveness of laxatives in the elderly.* National Coordinating Centre for Health Technology Assessment. Southampton: 1997

Pierfitte C, Macouillard G, Thicoipe M, *et al.* Benzodiazepines and hip fracture in elderly people: case-control study. *Brit Med J* 2001; 322: 704-708

Pincombe J, O'Brien B, Cheek J *et al.* Critical aspects of nursing in aged and extended care. *J Adv Nurs* 1996; 23:672-678

Ray WA. A study of antipsychotic drug use in nursing homes: epidemiological evidence suggests misuse. *AJPH* 1980; 70(5): 485-491f

Ray WA. Population-Based Studies of Averse Drug Effects. *N Engl J Med* 2003; 349: 1592-1594

Redfern S and Norman I. Quality of nursing care perceived by patients and their nurses: An application of the critical incident technique. Part 1. *J Clin Nurs* 1999; 8: 407-421

Resnick B. Motivation to perform activities of daily living in the institutionalised older adult: can a leopard change its spots? *J Adv Nurs* 1999; 29(4): 792-799

Reynolds CF, Cupfer DJ, Hock CC *et al.* Sleeping pills for the elderly: are they ever justified? *J Clin Psychiatry* 1985; 46(2): 9-11

Rigby KD and Litt JCB. Errors in health care management: What do they cost? *Int J Qual Health Care* 2000; 9(4): 216-221

Robertson J, Fryer JL, O'Connell DL *et al.* Personal formularies. An index of prescribing quality? *Eur J Clin Pharmacol* 2001; 57: 333-341

Roe B and May C. Incontinence and sexuality: findings from a qualitative perspective. *J Adv Nurs* 1999; 30(3): 573-579

Rochon PA and Gurwitz JH. Optimising drug treatment for elderly people: a prescribing cascade. *Brit Med J* 1997; 315: 1096-1099

Rollason V and Vogt N. Reduction of Polypharmacy in the Elderly. A systematic review of the role of the pharmacist. *Drugs Aging* 2003; 20(1): 817-832

Ronning M. Setting up the WHO ATC classification of drugs and the defined daily dose. In: Handbook of Drug Use Research Methodology. McGavock H Ed. United Kingdom Drug Utilisation Group, 2000

Roper N, Logan WW, Tierney AJ. *The elements of nursing. A model of nursing, based on a model of living.* Edinburgh: Churchill Livingstone, 1990

Rosack J. Depression, pain connection should be assessed in elderly. *Psychiatric News* 2003; 38(8): 38

Roughead EE, Semple SJ and Gilbert AL. Quality use of medicines in aged-care facilities in Australia. *Drugs Ageing* 2003; 20 (9): 643-653

Routledge PA, Mahony MS and Woodhouse KW. Adverse drug reactions in elderly patients. *Br J Clin Pharmacol* 2003; 57 (2): 121-126

Royal College of Physicians of London. *Medication for Older People.* 2nd edition. London: RCP:1997

Royal College of Physicians of London. *National Sentinal Clinical Audit. Evidence-Based Prescribing for Older People.* London: RCP Clinical Effectiveness and Evaluation Unit, 2001

Royal College of Physicians of London and the British Geriatric Society. *High quality long-term care for elderly people. Guidelines and audit measures.* London: RCP, 1992a

Royal College of Physicians of London and the British Geriatric Society *Standardised assessment scales for elderly people.* London: RCP and BGS, 1992b

Royal College of Physicians of London and the British Geriatric Society. *Enhancing the health of older people in long-term care: clinical guidelines.* London: RCP and BGS, 1998

Royal Pharmaceutical Society of London. *The Administration and Control of Medicines in Care Homes and Childrens Services.* London: RPS, 2003

Ryan MJ, Kidder SW, Daiello LA *et al.* Psychopharmacologic interventions in nursing homes: What do we know and where should we go? *Psychiatr Serv* 2002; 53: 1407-1413

Rycroft-Malone J, Latter S, Yerrel P, *et al.* Nursing and medication education. *Nurs Stand* 2000; 14(50): 35-39

Salvage J and Kershaw BB. *Models for nursing 2.* London: Scutari Press, 1990

Schmidt IG, Claesson CB, Westerholm B *et al.* Physicians and staff assessments of drug interventions and outcomes in Swedish nursing homes. *Geriatr Gerontol* 1998; 32: 27-32

Schmidt IK and Svarstad BL. Nurse-physician communication and quality of drug use in Swedish nursing homes. *Social Science and Medicine* 2002; 54: 1767-1777

Seevak E, Kent DJ, Wagner E. A Pharmacist-based Screening Program of Octogenarians Starting New Medications. *J Manag Care Pharm* 2003; 9(1): 13-18

Shah S, Vanclay F, Cooper B. Improving the sensitivity of the Barthel Index for stroke rehabilitation. *J Clin Epidemiol* 1989; 42: 703-9

Sheehan J, Reardon M, Twomey C, *et al.* The effects of hospital admission on drug prescribing in an elderly population. *Ir Med J* 1996; 89(3): 115

Shepherd M. The risks of polypharmacy. *Nurs Times* 1998; 94(32): 60-62

Sindhu F. Are non-pharmacological nursing interventions for the management of pain effective? A meta-analysis. *J Adv Nurs* 1996; 24: 1152-9

Small GW, Rabins PV, Barry PP *et al.* Diagnosis and treatment of Alzheimer disease and related disorders. Consensus statement of the American Association for Geriatrics Society, the Alzheimers Association, and the American Geriatrics Society. Review. *J Am Med Assoc* 1997; 278:1363-71

Sommerville H. Pharmacy services for the elderly in residential and nursing homes. *Pharmaceut J* 1997; 259: 683-685

Spath HM, Charavel M, Morelle M *et al.* A qualitative approach to the use of economic data in the selection of medicines for hospital formularies: a French survey. *Pharm World Sci* 2003; 25(6): 269-275

Stein CM, Griffin MR, Taylor JA *et al.* Educational program for nursing home physicians and staff to reduce use of non-steroidal anti-inflammatory drugs among nursing home residents. A randomized controlled trial. *Medical Care* 2001; 39: 436-445

Steiner A, Walsh B, Pickering RM, *et al.* Therapeutic nursing or unblocking beds? A randomised control trial of a post-acute intermediate care unit. *Brit Med J* 2001; 322: 453-460

Steinbrook R. The prescription – drug problem. *N Engl J Med* 2002; 346(11): 790

Stewart DA, Lennox IM, Gilchrist W *et al.* Admission dependency and outcome in elderly patients admitted for NHS continuing care. The Glasgow experience. *Health Bulletin* 1994; 52(4): 240-247

Strachan-Bennett S. Noise reduction measures give patients a better night's sleep. *Am J Nurs* 2004; 104: 40-48

Swift CG. Falls in late life and their consequences – implementing effective services. *Brit Med J* 2001; 322: 855-857

Thomas LH, McColl E, Cullum N *et al.* Clinical guidelines in nursing, midwifery and the therapies: A Systematic Review. *J Adv Nurs* 1999; 30(1): 40-50

Thomas EJ and Brennan TA. Incidence and types of preventable adverse effects in elderly patients: population based review of medical records. *Brit Med J* 2000; 320: 741-744

Timmons S, McCarthy F, Duggan J *et al.* Anticonvulsant use in elderly patients in long-term care units. *Ir J Med Sci* 2003; 172(2): 66-68

Tinetti ME, Baker DI, McAvay G, *et al.* A multifactorial intervention to reduce the risk of falling among elderly people living in the community. *N Engl J Med* 1994; 331(13): 821-827

Tinetti ME. Preventing falls in elderly persons. *N Eng J Med* 2003; 348: 42-9

Tomalin DA, Redfern SJ, Norman IJ. Inter-rater reliability of Monitor, Senior Monitor and Qualpacs. *J Adv Nurs* 1993; 18(7): 1152-1158

van Dijk KN, de Vries CS, van den Berg PB *et al.* Drug utilisation in Dutch nursing homes. *Eur J Clin Pharmacol* 2000; 55: 765-771

van Eijk, Avorn J, Porsius AJ, *et al.* Reducing prescribing of highly anticholinergic antidepressants for elderly people: randomised trial of group versus individual academic detailing. *Brit Med J* 2001; 322: 654-658

Veehof LJG, Stewart RE, Meyboom-de Jong B *et al.* Adverse drug reactions and polypharmacy in the elderly in general practice. *Eur J Clin Pharmacol* 1999; 55: 533-536

Venning P, Durie A, Roland M *et al.* Randomised controlled trial comparing cost effectiveness of general practitioners and nurse practitioners in primary care. *Brit Med J* 2000; 320: 1048-1053

Wade S. Promoting quality of care for older people: developing positive attitudes to working with older people. *J Nurs Manag* 1999; 7: 339-347

Walley T and Haycox A. Pharmacoeconomics: basic concepts and terminology. *Brit J Clin Pharmacol* 1997; 43: 343-348

Walley T and Scott AK. Prescribing in the elderly. *J Postgrad Med* 1995; 71: 466-471

Watkins C, Moore L, Harvey I *et al.* Characteristics of general practitioners who frequently see drug representatives: national cross sectional survey. *Brit Med J* 2003: 326: 1178-1179

Watson R. Medications and older people. *Nursing Older People* 2000; 12(6): 21-25

Wayne S, Rhyne R, Stratton M. Longitudinal Prescribing Patterns in a Nursing Home Population. *J Am Geriatr Soc* 1992; 40(1): 53-56

Weedle PB, Poston JW and Parish PA. The use of digoxin in 55 residential homes for elderly people. *J Postgrad Med* 1988; 64: 292-6

Weedle PB, Poston JW and Parish PA. Drug prescribing in residential homes for elderly people in the United Kingdom. *Ann Pharmacother* 1990; 24: 533-6

Weedle PB and Poston JW. Reducing drug costs for elderly patients in residential homes. *Pharmaceut J* 1985; Oct: 454-456

WHO Collaborating Centre for Drugs Statistics Methodology. *Guidelines for ATC classification.* Oslo: WHO, 1993

Williams B and Betley C. Inappropriate use of non-psychotic medications in nursing homes. *J Am Geriatr Soc* 1995; 43: 513-9

Williams BR, Nichol MB, Lowe B *et al.* Medication use in residential care facilities for the elderly. *Ann Pharmacol Ther* 1999; 33(2): 149-155

Williams D, Bennett K, Feely J. Evidence for an age and gender bias in the secondary prevention of ischaemic heart disease in primary care. *Brit J Clin Pharmacol* 2003; 55(6): 604-8

Williams KS, Crichton NJ, Roe B. Disseminating research evidence. A controlled trial in continence care. *J Adv Nurs* 1997; 25: 691-698

Williams ME, Pulliam CC, Hunter R *et al.* The short-term effect of interdisciplinary medication review on function and cost in ambulatory elderly people. *JAGS* 2004; 52: 93-98

Wright N, Caplan R, Payne S. Community survey of long-term daytime use of benzodiazepines. *Brit Med J* 1994; 309: 27-28

Wright SG. The Need to Develop Nursing Practice Through Innovation and Practice Change. *Int J Nurs Pract* 1996; 2: 142-148

Wright, S. *My Patient – My Nurse: The Practice of Primary Nursing.* 2nd Edition. Scutari Press. London. 1994

Wood S. *Non-pharmacological strategies for pain management.* In: Pain Management. London: Emap Healthcare Limited 2003

Wynne HA. Sensible prescribing for older people. *Clin Med* 2003; 3(5): 409-412

Zermansky AG, Petty DR, Raynor DK *et al*. Randomised controlled trial of clinical medication review by a pharmacist of elderly patient receiving repeat prescription in general practice. *Brit Med J* 2001; 323: 1340-1343

Appendix 1

Drug Update programme

Pharmacology and medications

Learning objectives for the two day programme are given below.

After the sessions the participant will be able to:

- Describe the pharmacokinetic and pharmacodynamic changes that occur in older age;

- Identify the altered effects of drugs on older people;

✓ Absorption
✓ Distribution
✓ Metabolism
✓ Excretion

- Discuss the potential benefits and risks of drug therapy in older people;

✓ Drug interactions
✓ Adverse drug reactions
✓ Drug toxicity

- Discuss special considerations for medications in continuing care settings;

✓ Toxic characteristics of Specific Drugs Prescribed for Older People
✓ Drugs Use in Older adults: Priniciples of Assessment
✓ Measures Taken to reduce Need for Medication
✓ Pain and Comfort

- Discuss the role of the pharmacist in medication for older people.

Appendix 2. Guidelines for the Administration of Medicines within Services for Older People.

EAST COAST AREA HEALTH BOARD
Bord Sláinte Limistéar an Chósta Thoir

Guidelines for the Safe Administration of Medicines within Services for Older People

Contents

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Introduction

Managing medicines in older people is an integral part of maintaining quality of the physical, psychological and social well-being in this sometimes vulnerable patient group. Since there are a number of competing demands in drawing up a policy document to ensure that it is realistic, achievable, accessible and relevant to the service, a novel approach was taken in this case. This policy was written by a multidisciplinary team using a rigorous approach with wide consultation.

Firstly a comprehensive review of the literature was undertaken, relevant documents such as the Nursing Board's 'Guidance to Nurses and Midwives on the Development of Policies, Guidelines and Protocols' were accessed and Hospitals in Ireland and Trusts in the UK were contacted to seek copies of their policies. Meetings were set up with the Chief Executive Officer of the then Eastern Health Board to secure permission and funding and with the Directors of Nursing and General Managers from the four participating sites to secure their support. A partnership was established with the Department of Pharmacology and Therapeutics in the Faculty of Health Sciences, Trinity College Dublin. This ensured the project could have sound academic underpinning and included open access to the National Medicines Information Centre in Dublin. A Steering Group was then established which included a pharmacist, General Practitioner, Hospital Manager, Director of Nursing and practitioners. This group also had access to an external facilitator. The Steering Group developed an agenda to define the issues, agreed the timescale, identify external expertise required, establish local subgroups and review the policies obtained from other organisations. A draft policy was developed and tested with external experts from pharmacy, risk management, law, the Irish Medicines Board, and the European Foundation for the Advancement of Healthcare Practitioners/Institute for Safe Medication Practices. Under the guidance of the team at Trinity, the policy was redrafted in response to feedback. All nurses working in the participating sites were enabled to comment on the penultimate draft as part of a drug update programme for all staff. All feedback from practitioners was noted by a rapporteur and fed back into the Steering Group. The Directors of Services for Older People were also consulted. Over 200 people took part in the exercise.

I would like to take this opportunity to thank everybody that contributed to the document and participated in the local groups. Special thanks are due to the Steering Group.

Helen Flint,
Director of Nursing Research & Development

Purpose of the Guidelines

The purpose of this document is to provide clear guidelines and advice on best practice in the prescribing, ordering, safe storage, administration and record keeping related to the administration of medicines in designated hospitals, homes and units for older people.

A multidisciplinary group has drawn up a framework with reference to the *Guidance to Nurses and Midwives on the Development of Policies, Guidelines and Protocols* (An Bord Altranais, 2000) which describes their five key functions, namely to:

- improve and standardise patient care;
- act as a basis for audit and evaluation of care;
- provide guidance for practitioners on appropriate parameters of care;
- facilitate effective staff induction;
- act as educational tools.

Consideration has been given to the extent to which these policies, guidelines and protocols are realistically achievable through wide discussion with all members of staff involved. Each unit should plan to review and refine them as necessary. This will be in tandem with on-going clinical audit, which includes all aspects of patient documentation including prescription sheets.

Guidance to Nurses and Midwives on the Administration of Medical Preparations (An Bord Altranais 2000) states:

"Nurses who give medical preparations are responsible for their safe administration"

The administration of medicines is an integral part of the role of all registered nurses. It is the responsibility of the nurse to act in the role of gatekeeper of care, between the prescribing and administration of drugs.

When a nurse is in doubt she should actively seek further information and professional advice from senior colleagues. Some helpful sources of information are included in this document.

Relevant Statutes and Regulations

Prior to administering drugs a registered nurse should be familiar with:

- Misuse of Drugs Acts 1977, 1984
- Nurses Act, 1985
- Health, Safety and Welfare at Work Act, 1989
- Patients Charter, 1991
- Nursing Homes Care and Welfare Regulations, 1993
- An Bord Altranais: Code of Professional Conduct for each Nurse and Midwife, 2000
- An Bord Altranais: Guidance to Nurses and Midwives on the Administration of Medical Preparations, 2000

The Code of Professional Conduct

The Code of Professional Conduct for each Nurse and Midwife states that:

"...each registered nurse is accountable for his/her practice."

This involves keeping up-to-date with relevant knowledge in their area of practice, as well as An Bord Altranais publications.

The Guidance to Nurses and Midwives on the Administration of Medical Preparations document contains explicit principles for nurses outlining their role and responsibilities including:

- nurses must act in accordance with written policy
- nurses should be alert to the nature of medical preparations
- nurses should ensure there is no accumulation of medical preparations
- nurses must be certain of the identity of the patient
- nurses should assist in assessing the safety of prescribed medical preparations, in the monitoring of interactions and in subsequently informing the Medical Officer
- nurses should take appropriate steps to develop their knowledge and competence and seek assistance where required

Prescribing Guidelines and Prescription Writing

Guidelines for medical staff when prescribing medication are given in the British National Formulary, which states:

"Old people, especially the very old, require special care and consideration from prescribers"

The aim of these guidelines is to protect both patients and staff by ensuring safe prescribing practices are evident. It is therefore important that prescriptions are legible and that polypharmacy is avoided where possible.

It is essential that the medical and nursing staff communicate effectively, with nurses playing a full and active role as outlined above.

Policy for the Administration of Medicines

"A policy document outlines a principle that governs activity and which individuals are expected to follow"

An Bord Altranais December 2000

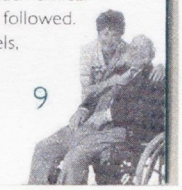
- Only drugs which are written on the prescription sheet or other approved written recording sheet should be routinely administered. All prescription-only medicines should be prescribed by the Medical Officer, and note should be made of any non-prescription medicines which are administered by the nursing staff. A Medical Officer should prescribe all medication which is required on a regular basis in any form and by any route. It is not expected that nurses write out prescription sheets as this may lead to errors. The use of 'post-it" labels is not recommended as they do not act as a permanent record.
- *"It is not acceptable practice that a nurse administers a medical preparation on the basis of an order by telephone or verbal instruction"* **An Bord Altranais, 2000**

  However, where the patient needs a drug, and the doctor is unable to attend, a faxed prescription will suffice. This should be regarded as the same as any other doctor's prescription, and must therefore be on hand when the medication is dispensed. It is expected that the Medical Officer will make a permanent record on their next visit to the ward.
- Drug rounds must be carried out on time to ensure that patients receive drugs at the appropriate intervals. The unlocked drug trolley should never be left unattended during the round.
- Before administering any drug the registered nurse must check the patient's identity and the name, strength and expiry date of the drug. Where two patients have the same or similar names this should be indicated clearly with the appropriate coloured sticker. A red sticker usually indicates allergies.
- It is the responsibility of the nurse to ensure that the medication has been taken. Drugs must not be left on lockers.
- It is recommended that patients take at least 150mls of water, swallowing some before the medicines. Patients may find it easier to take tablets from a tray or in their hand rather than a medicine pot. For ease of administration, some medicines may be administered following crushing and adding to suitable medium, such as yoghurt, provided that the pharmaceutical properties of the medications are not affected.
- Once the drug has been administered, the nurse must sign to this effect on the prescription chart.
- If a drug is missed or omitted it should be marked in the box with a cross, the reason given and the chart signed by the nurse.
- If the patient is absent from the clinical area, the drug schedule should be retimed if appropriate.
- No medication should be dispensed that is not taken directly from its container. Tablets should not be handled. Labelling should be clear and distinct: damaged or obliterated labels should be returned to pharmacy. Tablets must never be decanted from one container to another.

Protocols for Ordering, Storing, Administrating and Recording Medication

1. Safe ordering of Medicines

It is usual to order pharmacy supplies on a weekly basis. Each clinical area has its own local order procedures, which should be followed. Before ordering any supplies, staff should check stock levels, thereby avoiding duplicating stock.



When ordering drugs, state clearly:
- Name
- Strength
- Preparation required i.e. elixir, suppository

A designated member of staff should check deliveries from pharmacy on arrival. Discrepancies should be recorded on the return sheet.

Drugs not in use, especially controlled drugs, should be returned to the pharmacy, either to the pharmacist on the day they attend, or by messenger (CD2 drugs only) on the next working day the central pharmacy is open.

2. Safe Storage of Medicines
Drugs in current use, other than CD2 types, should be stored in the mobile medicine trolley, which is kept locked at all times when unattended. Extra security measures such as locking the trolley to a wall and/or storing it in a secure room are advisable. Prescribed medication should not be stored on the bottom of the trolley.

All stock for "top-up" should be stored in a locked cupboard in the Treatment Room.

The drug keys must be held by a registered nurse at all times and returned to the Nurse-in-Charge of the ward after use. (In any clinical area where the primary nurse usually holds keys for the duration of the shift, this is normally accepted as local policy).
All other hazardous substances should be stored safely as indicated on the label or packaging.

3. Single Nurse Administration of Medicines
Registered nurses are able to administer medication without involving a second nurse, except in the following circumstances:
- Controlled drugs
- Intramuscular injections
- Intravenous infusions and intravenous administration of drugs
- Subcutaneous infusions and subcutaneous injections
- Any medication which involves calculations
- Any medication administered outside the normal therapeutic range

It must be remembered that the administration of medicines is only part of the total patient care, and therefore, as appropriate, the administration of oral medication may be delegated to another member of the care team or family member. However, it is the responsibility of the registered nurse to ensure that the patient has taken the drug.

4. Record Keeping
Drug records are retained for a period of not less than five years.
They should be fully completed by the nurse who administered the medication: although prescription charts may be initialled, both members of staff who are involved in the process should sign for CD2 drugs in full. (Where initials are used, it is the responsibility of ward staff to ensure that records are kept of all agency and other short-term nurses).
Adverse drug reactions should be reported immediately to the Medical Officer, relevant interventions administered and the event reported to Nursing Administration. Adverse reactions should be recorded on the prescription sheet where appropriate and in the patients care plan documentation. Relevant documentation should be submitted to the Irish Medicines Board.

Drug Administration Errors

It is important to report all drug errors, not only because they can result in potentially serious risk for the patient, but also because action needs to be taken to prevent a similar incident happening in the future. Staff should feel able to report errors without feeling threatened, provided they have acted in a reasonable manner and followed local policies, guidelines and protocols.

In the event of errors in the administration of a drug such as:
- A drug given to the wrong patient
- The wrong drug given to a patient
- A patient failing to receive a drug (missed dose)
- The correct drug but incorrect dosage of that drug given to a patient
- A drug administered by an incorrect route

The Nurse-in Charge of the ward should check

with their colleagues that this is not a recording error before proceeding with the following action:

- Inform the Medical Officer immediately the mistake is discovered
- Observe the effect on the patient
- Maintain and record routine observations
- Inform the Director of Nursing or their deputy
- Record the error in the patients nursing care plan/medical notes
- Complete report according to local policy
- Maintain a personal record of the incident
- The Medical Officer should inform the patient or their relatives as appropriate

Controlled Drugs

1.Ordering

Orders for preparations controlled by the Misuse of Drugs Act (MDA) must be made in the appropriate requisition book using a separate page for each item. These drugs must be collected from the pharmacy and signed for by a member of staff: where this is a transport messenger, a second signature is required from the designated nurse who receives the delivery, usually the person in charge of the hospital at that time. CD2 medicines should be transported in a secured box.

Two nurses must check the requisition against the drugs received and record the balance in the MDA book before locking the stock in the MDA cupboard.

The Clinical Nurse Manager is required either to keep copies of requisitions submitted to whichever source supplies the controlled drugs for the ward.

2. Storage

MDA drugs should be stored in the designated MDA cupboard (either a locked section within a locked outer cupboard, or the Controlled Drug Cupboard in the Duty Room). The keys may be held only by a registered nurse, who should return them to the Nurse-in-Charge of the ward after use. Keys may be attached to the uniform for safety and ease of location.

3. Safe administration

All controlled drugs must be checked by two registered nurses. (This

policy may differ in areas that have student nurses allocated). Hospital policy should be strictly adhered to at every stage.

4. Disposal of Controlled Drugs

If a Controlled Drug supplied in an ampoule is prepared by a nurse and not used, or only partly used, this drug (or the remainder of the unused drug) should be destroyed in the presence of a second nurse by flushing it away in the sink. A note is then made in the record book to that effect together with the signature of both nurses. Controlled drugs in tablet form are returned to the Controlled Drug Cupboard and included in the stock balance in the usual way until they can be returned to the pharmacy. All other tablets should be returned to the pharmacy in the drug box. In any case of medicines being absent for any reason they should be regarded as missing and reported to Nursing Administration.

5. Recording of Controlled Drugs

The nurse should complete the Controlled Drug Register with the following information:

- Date
- Time of administration
- Forename and surname of the patient
- Identity and dosage of the drug
- Signature of both administrator and witness

Both nurses should be present to agree the identity of the patient according to local policy, and witness administration. The administration of CD2 drugs is recorded in the patients prescription sheet, the controlled drugs log and the patients care plan.

6. Checking

All stocks of MDA drugs must be checked daily by two registered nurses and the process recorded. (Some areas check at the end of each shift). Any discrepancy must be reported immediately to the Clinical Nurse Manager and the Director of Nursing and Hospital Manager informed. A full written report will be required.

APPENDIX

Information Sources

Hospital Pharmacist, Central or Local Pharmacy
Pharmacists are highly skilled professionals who have in-depth knowledge, not only of dispensing drugs but also of the drugs themselves: as such they are a key resource for drug information.

MIMS Ireland
MIMS is an independently written publication designed as a prescribing guide for GPs. The drug monographs are deliberately concise and it is strongly advised to refer to other sources when full details and the clinical significance of the products contraindications, special precautions, drug interactions, adverse reactions or overdosage are required. It is supplied free of charge to GPs monthly, and three times a year to hospital doctors.

British National Formulary (BNF)
The BNF is a joint publication of the British Medical Association and the Royal Pharmaceutical Society. It aims to provide doctors, pharmacists and other healthcare professionals with sound up-to-date information about the use of medicines. It is designed as a digest for rapid reference, providing ready access to key information on the selection, prescribing, dispensing and administration of medicines. Basic information is drawn from several different sources; advice on the therapeutic use of medicines and on the choice of drugs is constructed from clinical literature and reflects, wherever possible, an evaluation of the evidence.
Biannual publication allows the BNF to reflect promptly changes in product availability as well as emerging safety concerns and shifts in clinical practice.

A recent copy of the BNF should always be available in each clinical area.

National Medicines Information Centre
The National Medicines Information Centre (NMIC) was established in September 1994 and is located at St. James's Hospital, Dublin. The centre employs a staff of five, namely a Medical Adviser, Pharmacist Co-ordinator, two Senior Drug Information Pharmacists and full time secretarial support. The NMIC is equipped with a wide range of resources including medical and pharmaceutical textbooks, journals and computerised databases such as Medline and Micromedics. Healthcare professionals are invited to avail of these resources following prior notification to the centre's staff.
Their primary function involves enquiry answering. They are in a position to provide independent information to healthcare professionals particularly general practitioners and community pharmacists on a variety of topics including:
- indications for specific drugs, contraindications and dosage;
- drug interactions and adverse effects;
- drug use in pregnancy, lactation, liver and renal impairment;
- identification of medicines.

The NMIC is open from 9am - 5pm Monday to Friday inclusive.
Tel: 1850 727 727 (01) 4730589 (01) 4537941 ext. 2348 Fax: (01) 4730596
A telephone answering service is in operation during lunchtime (1pm - 2.15pm) and after hours.

Irish Medicines Board (IMB)
The IMB is the competent authority for licensing of medicines (human and veterinary) in Ireland. In order to obtain a licence, pharmaceutical companies are required to provide adequate quality, safety and efficacy data in respect of the product for which they wish to obtain the licence.
As part of its remit to monitor the on-going safety of medicines on the Irish market, the IMB has established a system for reporting of adverse reactions suspected in association with the use of medicines, using a freepost service. Healthcare professionals (Doctors/Dentists/Nurses/Pharmacists) are encouraged to use this system to draw attention to potential safety issues with medicines.
Post-paid report cards are available for reporting from the IMB. Tel: (01) 6764971 or download from www.imb.ie

The National Poisons Information Centre
The Poisons Centre is located in Beaumont Hospital and operates 365 days a year. It provides a 24-hour service to medical staff and other health care professionals.
The main function of the Poisons Information Centre is to provide information on the management of acute poisoning. Poisons may include pharmaceuticals, agrochemicals, household products and plants. The

APPENDIX

service is aimed primarily towards members of the medical profession but also provides a limited service to members of the public.
The poisons information officers can provide information to assist in the management of poisoned patients, but they are not qualified to make clinical decisions regarding admission or discharge of a patient.
Before phoning the Poisons Information Centre, it is useful to have the following information available:
- name and age of patient;
- name of drug, chemical, household product etc;
- quantity of agent involved;
- route of exposure (ingestion, inhalation, skin contact);
- time since exposure and symptoms of toxicity.

The information officers answer enquiries between 8am and 10pm every day. At other times, telephone enquiries are automatically re-routed to the Welsh Poisons Centre in Cardiff.
The phone numbers are: (01) 837 9964/6 and (01) 809 2566/8

The Royal Marsden Hospital Manual of Clinical Nursing Procedures
This manual is available in each hospital, and is the outcome of constant review and refinement to produce guidelines for the best evidence-based practice. Production of the manual therefore not only involves writing chapters, but also complete appraisal of research literature, national and local guidelines and audit results. The chapter on Drug Administration includes clinical guidelines.

CINAHL/MEDLINE
The Cumulative Index to Nursing and Allied Health Literature (CINAHL) is an American database which may be used to look up nursing information. Medline is a medical database which lists references to information in the health/medical area, generally articles, but also conference papers, dissertations &C. Medline contains a wider range of material than CINAHL, although there is considerable overlap, with roughly two thirds of the references on CINAHL also appearing on Medline. Nursing staff should have local access to a computer, which holds these systems. The Department of Health & Children sponsor training courses.

The Regional Library Service, based in Dr. Steeven's Hospital, is available to help staff in locating information, including literature searches on Medline/CINAHL and other relevant databases.
The library is open from 10am – 4.45pm Monday to Friday except Wednesday morning. Closed 1 – 2pm.
Tel: (01) 635 2556 Fax: (01) 635 2557 e-mail: library@erha.ie

Misuse of Drugs Act

Under these Acts medical preparations which are controlled drugs are classified in five Schedules. These Schedules establish different controls.

CD1 includes raw opium, coca leaf, cannabis and the major hallucinogenic drugs (L.S.D., Mescaline, Psilocin, etc.). These are substances which have little, if any, therapeutic value but which have a strong potential for abuse. A *special licence* is required for *any* activity in respect of these drugs. In practice, such activities are strictly limited to scientific research or forensic analysis. They are, therefore, of little relevance to health care professionals.

CD2 consists of drugs for which a license is required for import and export. Those entitled to produce or supply them are listed. A pharmacist may supply to a patient only on the authority of a prescription written in the prescribed form. Record keeping requirements (including CD register) apply in full. Possession without an appropriate authority is an offence. Destruction must be witnessed and safe custody maintained.

CD3 included drugs to which the following provisions obtain:
- record-keeping requirements in a CD register do not apply;
- destruction need not be witnessed.

It should be noted that the safe custody provisions apply to these drugs, as do the controlled drug prescription writing requirements.

CD4 consists mainly of the benzodiazepine tranquillisers and phenobarbitone preparations containing less than 100mg. Selegiline (Eldepryl) is also included in CD4. Control of these preparations under the Act is minimal and, in practice, they should be supplied in

APPENDIX

accordance with the Medical Preparations (Prescription and Control of Supply) Regulations 1993, where they are S1A (Selegiline is S1B). Record-keeping in a controlled drug register, the retention of invoices and safe custody regulations do not pertain to drugs in this schedule.

CD5 contains preparations *exempt* from most restrictions under the regulations. It includes certain preparations (but not injections) containing codeine, nicocodine, norcodeine, acetyldihydrocodeine, ethylmorphine and pholcodine mixed with other substances and containing less than 100mg per dosage unit or not more than 2.5% in undivided preparations. It should be noted that invoices must be retained for two years. The following currently available preparations are also included:

- preparations of dihydrocodeine (not injections) containing not more than 10mg pr dosage unit as base and, in the case of undivided preparations, not more than 1.5% as base;
- preparations of codeine containing not more than 0.1% calculated as cocaine base;
- preparations of medicinal opium or morphine containing not more than0.2% calculated as anhydrous morphine base;
- preparations of diphenoxylate containing not more then 2.5mg of diphenoxylate calculated as base and a quantity of atrophine sulphate equivalent to at least 1% of the dose of diphenoxylate (e.g. Lomotil);
- preparations for oral administration containing not more than 135mg of dextropropoxyphene (e.g. Distalgesic, Dolxene Co).

Appendix 3. Paper presented at the Irish Geriatric Society Annual Conference, September 2003

A case-control study comparing drug prescribing in older people in long-stay care with those residents in the community

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Introduction: There is some evidence that prescribing practices for residents in long-stay care may benefit from critical review. (Fahey T et al., BMJ 2003; 326: 580-583; O'Grady M, Weedle P. IMJ 1998; 91 (5): 172-174.

Methods: Older people (age >65years), of whom 495 were residents in long-stay hospitals (cases), were randomly matched (5:1), by gender and age, with 2,475 older people living in the community (controls). Prescription charts were analysed on all cases, and control data available through the GMS payments board. Costs per item were calculated. Odds ratios were calculated using conditional logistic regression.

Results: Cases were prescribed more medications than controls. The mean number of drugs prescribed in the controls was 5.16 (SD=3.75) and 10.50 (SD=4.14) in the cases. Excluding p.r.n. medications the mean number in the cases was reduced to 7.20 (SD=2.96). The mean cost per patient in the controls was 56.88 (SD=67.30) compared to 188.56 (SD=155.676) in the cases. The mean cost per prescription was 11.03 (SD=18.13) compared to 18.06 (SD=37.91) in the cases. Cases were significantly more likely to be prescribed laxatives (OR=4.4, 95% CI-3.4, 5.8), analgesics (OR=1.8, 1.3, 2.4), vitamin B12 (OR=5.7, 3.0, 10.9) and all categories relating to the central nervous system (OR=3.9, 2.9, 5.1). Controls were prescribed significantly more nitrates (OR=2.4, 1.7, 3.7) and inhaled corticosteroids (OR=6.7, 3.2, 14.3).

Conclusion: This study suggests long-stay residents receive significantly more medications, and at greater cost than those living at home. They may be the greatest beneficiaries of appropriate and optimal medical treatment, but are also potentially at risk from inappropriate prescribing and adverse reactions.