COST EFFECTIVENESS AND INTERVENTIONS

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Dr. George W. Leeson
Oxford Institute of Ageing

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1. Introduction

In an earlier review paper (Leeson 2003), the effects of an ageing population on health care costs were examined. This was against a backdrop of policy makers in much of Europe and North America expressing deep concerns with regard to the increasing pressure on health and social care costs arising from the demographic ageing of their populations (Richter 1992). It turns out that a number of studies consider the determinants of health care costs, but in the work considered only one found that the ***age structure*** of the population (with the proportion of population aged 65 and over taken as the age structure indicator) is an explanatory factor alongside the effects of ***income, lifestyle characteristics, and environmental factors*** (Kleiman 1974; Getzen 1992; Gerdtham et al 1998; Hitris and Posnett 1992; Leu 1986; OECD 1987; O'Connell 1996; Gerdtham et al 1992, 1992a). Leeson (2003) addresses issues relating to population ageing and health and social care expenditure, including economic evaluations, drawing primarily on UK and North American literature from both medical and economics journals, and with the work of Seshamani and Gray (2002) providing valuable inspiration as well as concrete data.

This second review paper addresses more specifically the cost effectiveness of care interventions – with some general cases referenced but with more specific reference to work relating to falls, dementia, smoking and heart disease. This is however not a comprehensive review. The results of Leeson (2003) are briefly presented before proceeding with the review of literature relating to the cost effectiveness of interventions.

The number of journal articles on economic evaluations has increased dramatically through the 1980s and 1990s, totalling more than 5500 in peer-reviewed journals in those two decades, with approximately 4000 of these in the 1990s alone. However, there seems to be a consensus of opinion in the literature that economic evaluations lack methodological robustness and integrity in relation to resource allocation. Especially cross-national comparisons appear to be problematic.

The bibliography includes articles and work referenced in the body of this review paper but also additional work, which may prove useful.

We present briefly UK (and European) population data as a demographic backdrop (section 2) along with a brief review of UK policy initiatives for the health and social care of older people particularly aimed at preventing dependence (section 3). In section 4, the relevant work in Leeson (2003) is summarised with section 5 addressing the cost effectiveness and intervention issues.

2. The demographic backdrop

2.1 Mortality: Across Europe, the shadow of mortality has been lifting throughout the 20th century, the result being that new generations of Europeans can expect to live longer than any other previous generations – and significantly longer than their parents and grandparents and great grandparents, all of whom are likely to be alive when these new generations are born.

In the post war years, European countries fell quite nicely and orderly and naturally into a two tier classification as far as life expectancies were concerned with the more developed northern countries leading the way ahead of the less developed southern and eastern countries (Meslé 1996). European life expectancies did converge, however, in the course of the next 20-25 years especially as high mortality countries in the south and east experienced quite dramatic declines while the low mortality countries of the north were finding it difficult to push levels even lower.

At the end of the 20th century, the situation had changed again (Leeson 2002). While the countries of the European Union had continued their overall mortality declines and increasing life expectancies at birth, the Baltic States and the Eastern European countries are falling noticeably behind again.

The post war period is thus an interesting period in terms of European mortality development with the above-mentioned east-west differences. In the United Kingdom, mortality levels declined throughout the period at almost all ages, and with the exception of decreases in infant mortality, the mortality decline at around age 40 was the most significant in the 1970-1990 period. Table 1 presents the development in life expectancies at certain ages over more recent years. Life expectancies at birth in the United Kingdom increase throughout the period and for both sexes as mortality declines at almost all ages. In fact, in the United Kingdom, it is particularly the scale of the decline in adult and

old age mortality, which contributes to the observed increases in life expectancies at birth as infant mortality although declining is already so low in this country that the contribution of this decline to the increase in life expectancy at birth is more modest. And towards the end of the 20th century, almost all of the increase in life expectancy at birth in the United Kingdom is thanks to decreases in mortality at relatively high ages.

Table 1. Life expectancies at certain ages in the United Kingdom, males and females, 1980-2000

	Age 0		Age 50		Age 60		Age 80	
	M	F	M	F	M	F	M	F
1980	70.8	76.9	24.1	29.2	16.3	20.8	5.8	7.5
1985	71.7	77.6	24.9	29.8	16.8	21.2	6.0	7.8
1990	72.9	78.6	26.0	30.6	17.7	21.9	6.4	8.2
1995	74.0	79.2	26.7	31.1	18.4	22.3	6.5	8.4
1999	75.0	79.8	27.6	31.6	19.2	22.8	6.8	8.5
2000	75.3	80.1	27.9	31.8	19.5	23.0	7.0	8.6

Source: Recent demographic developments in Europe 2000, Council of Europe and *Office of National Statistics*

Mortality (and as mentioned in the introduction health care expenditure) seems increasingly to be related to life styles and behaviour, such as smoking, alcohol consumption and the consumption of animal fats. For instance, at the European level, alcohol-related cancer mortality is six times greater in the northwest of France than in southern Italy, and lung cancer mortality is much higher in the United Kingdom and Germany as well as the Benelux countries, where smoking has long been widespread and started at least a generation ago among younger people. Mortality from cardiovascular diseases is generally higher in Northern Europe where the use of animal fats is extensive compared with the Southern European countries where such mortality is lower.

Late-age mortality is an increasingly important component of overall mortality (Grundy 1997) and it is changes in these mortality levels that could still confound population forecasts, as they have done in the recent past (Leeson 1981).

2.2 Fertility: Fertility is the most evasive demographic component to describe and to predict. In general, the countries of Europe have come through the demographic transition (Livi-Bacci 1992) and entered what some demographers call the second demographic transition (van de Kaa 1987). It is

important to underline that there has never been a European pattern of fertility and probably never will be. Even during the demographic transition there were major differences both with regard to fertility levels and with regard to the date of the onset of the continual fertility decline. In the mid 1980s, many industrialised countries – not just in Europe – were experiencing historically low levels of fertility, and there was a widespread *fear* among demographers and decision-makers that this birth shortage inevitably would lead to population decline. A great deal of research was done at the time to document the consequences of declining and ageing populations which had climbed up the political agenda (Davis et al 1986).

Although calendar measures of fertility indicated a plateau at reproduction level in the 1930s and 1940s at what was seen as the end of the classical demographic transition and a subsequent further decline to levels significantly below replacement levels, generational measures of fertility indicated that in fact it seemed more feasible that fertility levels had simply been undergoing a continuous smooth decline since the decline of the transition had begun. In some countries, this downward trend had certainly been interrupted by periodic increases (during and immediately after the 2nd World War and in the mid 1960s), but these were by no means indicators of new lasting trends. Day (1995) implied that there is little or no agreement on the cause(s) of these trends. It may be that fundamental norms and values with regard to the need and desire to have children have changed radically, or it may be that the underlying economic structure in modern societies has changed and taken these childbearing norms with it. The evidence points in all directions. Wealthy nations – with welfare levels more than sufficient to induce childbearing – face massive population decline, while a country like Pakistan in the midst of an economic recession seems to be on the verge of a fertility transition despite the economic climate (Sathar and Casterline 1998).

Despite some increase in fertility levels in some countries towards the end of the 20th century, fertility remains well and truly below replacement levels of 2.1 in Europe and seems to be a characteristic of post-industrial societies. Fertility decline has not developed alone. It has been accompanied by quite dramatic shifts in associated behaviour (marriage patterns, divorce patterns, family structures, ages at birth, contraception methods etc), which in turn may or may not be affected

by the social and economic climate in a country. Whatever the causes of the decline, fertility behaviour and the associated norms and values as far as marriage and childbearing are concerned have undergone change.

Modern methods of contraception have made it simple to determine the exact number of children and the exact timing of births. In England & Wales, almost 10 per cent of the 1946-generation of women were childless by age 40. This had risen to almost 20 per cent for the 1960-generation. The total fertility rate for the UK and its development since 1960 is illustrated in table 2, and it is clear that fertility levels have been insufficient to reproduce and replace the population since the mid 1970s – and there is little substantial evidence of an upswing in levels.

Table 2. Total fertility rate (TFR) in the United Kingdom, 1960-2000

	Year					
	1960	1970	1980	1990	1995	2000
United Kingdom TFR	2.71	2.43	1.89	1.83	1.71	1.65

Note: The total fertility rate is the average number of children that would be born alive to a woman during her lifetime if she were to pass through and survive her childbearing years conforming to the age-specific fertility rates of a given year

Source: Recent Demographic Developments in Europe 2001, Council of Europe

2.3 Age structure : The UK national population age structure, in line with most Western countries, has aged continuously over the past century, the measure of ageing being an increase in the percentage of those over 60 years, and a decrease in those under 15 years. The 2001 Census noted the official *maturing* of the UK population, as the number of individuals aged over 60 was greater than those aged under 15. The proportion of the UK population aged over 60 had reached 21 per cent by 2001. Of these, 36 per cent were aged over 75, corresponding to 7.5 per cent of the total population, and 9 per cent were aged over 85, comprising 2 per cent of the total UK population. However, the numbers of older people in the UK are predicted to increase significantly over the next 25 years (table 3). Growth will be particularly significant among the oldest old – by 2025 more than one quarter of the UK's population will be aged over 60 years, with more than a third of these aged over 75 years. These demographics have arisen through the above-mentioned combination of decreasing mortality,

leading to increased longevity, and declining fertility, both resulting in a higher percentage of older adults within the population. As outlined above, life expectancy at birth has risen from 70.8 years for males and 76.9 years for females in 1980 to 75.3 and 80.1 years respectively in 2000. Alongside this, fertility declined more or less continually over the last 40 years of the 20th century, falling from 2.71 in 1964 to 1.65 in 2000.

Table 3. Census and projected population of the UK, 2001 and 2025. Thousands

Age group	2001		2025	
	Number	Percentage	Number	Percentage
0-14	11,105	18.9	10,512	16.2
15-29	11,077	18.8	11,117	17.1
30-44	13,271	22.6	12,910	19.9
45-59	11,115	18.9	12,672	19.5
60-74	7,816	13.3	11,234	17.3
75+	4,405	7.5	6,392	9.8
Total	58,789		64,836	

Source : Census 2001 and National population projections 2000-based

3. UK policy initiatives for the care of older people

The changing demographics of the UK population, which we have outlined above, has been reflected in considerable developments over the past two decades in health and social care policy for older people. As Harper and Leeson's (2002; 2003) recent review and evaluation of current government policy promoting independent living for older people argues, a shift has occurred with regard to both the health and social care policy agendas. With the rejection of institutional solutions comes the focus on independence and the provision of necessary care close to home. Some of the central concerns of policy development are to increase individual citizen input into this development, increase choice, increase diversity and increase inclusion, with self-reliance remaining one of government's key objectives. The concepts of active ageing, social inclusion and independence are complex concepts relying on a wide range of diverse but interrelated factors, and this has been reflected in recent policy developments in this area. Current Government policies for older and disabled people thus aim to promote health and independence, provide person-centred services to meet individual needs, help people remain in the community, support carers, modernize and integrate service, and deliver value for money. Such policies are very heavily reliant on the availability of unpaid informal, typically family

care from within the community (Harper and Leeson, 2002), and indeed current models for service distribution specifically factor in available family care (Harper and Leeson, 2003).

The White Paper on Community Care in 1989 emphasized the need for older people to stay at home for as long as possible (Department of Health, 1989). The resultant NHS and Community Care Act of 1990 aimed to encourage the development of community care provision, enabling older people to remain at home. In 2001, the *National Service Framework for Older People* (NSF) became the main policy instrument through which the government works to modernizing health and social care services for older people (Department of Health, 2001). The goals of the NSF for older people include promoting independence and person-centred care; improving the quality and consistency of services*;* expanding service capacity and the reform of long-term care. In July 2000, the Government announced in the *NHS Plan* (Department of Health, 2000) the development of services for older people. Intermediate care services between hospital and home were to be introduced to prevent loss of independence. By placing the focus on policies that enable older people to stay in their own homes while receiving care, the NHS Plan places independence as central, importantly supported by joined up thinking: "*housing, primary care, community health services and social services, together need to provide effective support*". A major stated objective is to ensure that older people can "*secure and sustain their independence in a home appropriate to their circumstance*". The government here emphasizes the inclusion and evaluation of the needs of vulnerable groups and the provision of guidance on good practice in healthcare delivery and support for *minority ethnic groups.*

The *Better Care, Higher Standards* is a joint measure from the Department of Health (DoH) and the Department of the Environment, Transport and the Regions (DETR), acting to inform those in receipt of care of the standards they can expect. Recognising the particular difficulties of older people, local authority strategies have shifted focus from simply protecting people to also protecting/adapting their properties, the idea being that more and better advice on home maintenance will help older people to plan their housing future as they grow older and face the possibility of frailty. Extra government funding for Home Improvement Agencies (HIA) has enabled many older people to stay in their own homes for longer periods. The *Supporting People Programme* will provide housing-related

support for vulnerable people from April 2003, such as information services and access to wider web services (DETR, 2001). *The Better Government for Older People Programme* and the *Interministerial Group* for older people also recommend measures which would decrease dependency, by providing more independent living opportunities, better quality provision of sheltered housing, and clear information and advice on what is available.

The cross-departmental initiative *Modernising Government* underlines the importance of the Department for Work and Pensions (DWP) strategy for alleviating poverty and promoting independence in retirement by means of increasing the take-up of existing services, including financial services as well as health and social care. One of the Department's key components for improving the delivery of benefits and information to pensioners is the *Pension Service*, which is delivered through 26 pension centres and is supported by a local service working with a range of partner organisations. At the same time, DWP together with a number of other government departments is developing *Third Age Services (TAS),* a holistic and joined-up model of service delivery for older people providing an integrated gateway to access benefits, health, housing and social care, in the first instance via inter-agency working. The development of TAS is part of a widespread growth in initiatives designed to facilitate the independence of older people by improving access to services. Others include *Care Direct,* a service led by the Department of Health but linked to NHS Direct and run locally by local authorities in partnership with other government and non-government organisations. Finally, *Sheltered housing* is the primary housing-based way of helping older people to maintain independence. It is available in the public or private sectors to rent, purchase or through shared ownership. Approximately ½ million older people live in rented sheltered housing accommodation in England with an additional 100,000 living in private sheltered housing otherwise known as retirement housing or leasehold schemes. The majority of sheltered housing residents have low incomes and are therefore dependent on income support or housing benefit to pay their rent, other essential housing costs and for housing support services, which are valued by residents as enabling them to live active and independent lives in the community.

4. Ageing and health care expenditure

As pointed out by Seshamani and Gray (2002), attempts to investigate the effects of demographics on health care expenditure have simply linked (chronological) age and the use and/or cost of health care services. These patterns are then applied to the demographics of a population (changing over time) to assess the affect of (changing) demographics on the use and cost of health care services. The results imply that age contributes to between 0.3 and 0.8 per cent of annual expenditure growth (OECD 1988; Gerdtham 1993; Barer et al 1989). This simple and illustrative way of assessing the age-cost effects does, however, ignore the fact that age-specific utilisation patterns among different age groups change over time. Changing demographics is not the only dynamic factor in the equation. Such a time-series approach have become more common and reveal that health care expenditures have increased disproportionately among the very young and the very old (Gerdtham 1993; Mendelson and Schwartz 1993; Cutler and Meara 1998; Barer et al 1987; Cutler and Meara 1999).

OECD data reveal that in developed countries, per capita health care costs for those aged 65 years and over have increased at the same rate at least as for those aged less than 65 years. ***The UK however does not exhibit this pattern*** – there is a disproportionately smaller increase in per capita costs for the older ages compared with younger age groups (Seshamani and Gray 2002). These authors have analysed this result in more detail to determine whether or not the UK ***is*** an exception in the trends of health care expenditure for older people.

In contrast to the findings of previous studies, Seshamani and Gray (2002) found that in England and Wales the high cost older age groups (65 years and over) did not have larger increases in their health care costs than the middle age groups in the period 1985-87 to 1996-99. On the contrary, for combined National Health Service care costs and for Hospital and Community Health Service costs, the oldest old (aged 85 years and over) had decreases in their real per capita costs while other age groups had real cost increases. This actually meant that the proportion of national health care expenditure allocated to the older age groups had decreased over time. The authors point out that this levelling out of expenditure allocation is mainly a result of moving costs away from the older

population for non-acute hospital care. Family health service costs and acute in-patient care costs increased relatively more for the older age groups.

The different patterns of cost-change for different age groups among the health care sectors may reflect:

- differing health service needs of the different age groups:
- different patient management schemes in the different sectors;
- decreased access to care for older patients, as has been demonstrated (Bowling et al 2001);
- a shifting of older patients from non-acute hospital and community health services to other social care settings (residential and nursing homes).

As far as the latter possibility is concerned, it has been shown that the market value of the nursing and residential care sector for older people increased by 43 per cent from 1988 to 1998 while the value of long stay hospital care in the national health service decreased by 52 per cent (Laing and Buisson 1999).

What does seem to be clear is that some service substitution out of the national health service has occurred.

Comparisons with Japan, Canada and Australia seem to indicate that the experience of the UK is the exception rather than the rule (Seshamani and Gray 2001). A number of studies have underlined that the observed relationship between health care expenditure and age can be explained by the concentration of health care expenditure in the period immediately prior to death (Lubitz and Riley 1993; McGrail et al 2000; Himsworth et al 1999;Zweifel et al 1999; O'Neill et al 2000). In other words, the higher health costs associated with older age groups need not be linked to age but rather to the increasing proximity of death.

The various (national) systems providing health care differ substantially, and thus far, no system provides the paradigm for others. There is a universal desire to limit government and private expenditures for health care while improving health care outcomes, thereby ensuring that health care productivity is an important policy issue as we move into the 21st century. The evaluation of the economics of care and the development of cost-effectiveness measures have been and remain an important issue for both researchers, practitioners and policy makers, perhaps increasingly as the

demographic ageing of the population combined with the seemingly endless opportunities for treatment and care appear to threaten the provision of health and social care. In many ways, however, this is a relatively new area, and the first paper for example to compare directly the efficiency of very different types of health care interventions and to challenge UK government policy was not published until 2001 (Fox-Rushby et al 2001). The increasing size and life expectancy of the aged population do give rise to concern for health care services and the financing of these services, and they have also given rise to theoretical analyses of medical care utilization based either on the traditional consumer theory approach (Grossman 1972), which sees demand as primarily patient driven, or on the principal agent set-up (Zweifel 1981), which is based on the physician (as the agent) determining utilization on the part of the patient. However, the latter has been questioned (Deb and Trived 1997).

Health economists often question the economic foundations of analyses, which is often based on calculating an incremental cost effectiveness ratio by comparing a new intervention against current practice, claiming this approach leads to contradictions (Donaldson et al 2002). The problem seems to be that incremental cost effectiveness ratios have more to do with resource allocation than cost effectiveness, and economic evaluations should therefore pay attention to the type of efficiency addressed and opportunity costs (where would resources come from and what would have to be given up?), refraining from making recommendations if resource allocation issues are involved.

In fact, criticism of economic evaluations seems to be the rule rather than the exception with various commentators calling for higher methodological quality (Jefferson and Demicheli 2002). This is interesting in view of the fact that economic evaluation over the last two decades of the 20th century established itself as one of the tools for health care decision-making (Drummond et al 1996). In the 1980s, approximately 1800 peer-reviewed journal articles on economic evaluations were published in medical journals alone, rising to almost 2300 in the first half of the 1990s (Elixhauser 1993; Elixhauser et al 1998). Since these evaluations are used to allocate scarce health care resources, it is only fair to appraise the soundness of the methodology being applied. Again the early 1990s saw doubts cast on the ***scientific reliability*** of evaluations (Udvarhelyi et al 1992; Gerard 1992; Adams et al 1992; Jefferson and Demicheli 1994). Some attributed this deficiency in the published work to a lack of peer

reviewers with health economics expertise (Jefferson and Demicheli 1995). The effects of various efforts to improve the quality seem limited (Jefferson and Demicheli 2002), and there remain problems with study design, data collection, analysis and interpretation (Petrou et al 2000).

Perhaps the multitude of evaluation methods and the critique of them led the Department of Health in the early 1990s to commission a systematic review of all published economic evaluations (Department of Health 1994) with a view to constructing an economic evaluation database. The question remains, however, how to extrapolate economic results between localities and countries, and caution seems to be the optimal advice available (Gosden and Torgerson 2002). Different conversion/extrapolation methods lead to very different cost utility ratios and there is no consensus as yet among health economists with regard to determining the right answer, which makes decision making rather hazardous. Shapiro et al (1999) point out that treatment decisions should not be based on the flow utility of the treatment in any given period but on the ***benefits that can be expected to accrue over a lifetime***. Health spending and health outcome may seem related, but American research indicates that ***health outcomes are independent of health spending and reimbursement systems*** so that spending appears to have low marginal value (Cutler 1995).

Before moving on to consider some of the work on the economics of (health and social care) interventions, it is perhaps opportune to mention work by Netten et al. (2002) on the development of a measure of social care outcome for older people. This paper tackles the necessity of identifying the outcomes of care in order to assess the cost-effectiveness of care. As pointed out above, utility-based health related quality of life measures are used widely but there is a need to develop measures relating to utility and welfare gain from social care interventions. The key areas of outcome of social care are food and nutrition; personal care; safety; social participation and involvement; control over daily life, some of which appear in the literature as decisive for maintaining the independence of older people too (Harper and Leeson 2003). The analyses revealed that personal care was the most important area followed by social participation and involvement with safety identified as the least important (even when relating to falls). Age rather than gender determined preferences: those aged 85 years and over being more concerned about food and nutrition and less about social participation and involvement.

Interestingly, those living alone rated social participation and involvement lower than those living with others.

In the following, a number of articles are referenced in a number of different fields. Attempts have been made to provide age-related information on the economics of intervention, but this has not always been possible, despite accessing approximately 60 theme related articles.

5.1 Heart Disease: one of the specific areas addressed in terms of cost-effectiveness is coronary heart disease, which as well as being the leading single cause of death in the UK is also an important cause of life-years lost prior to the age of 65 years (British Heart Foundation 1999). In a recent study (Liu, Maniadakis, Gray and Rayner 2002), the annual total cost of illness associated with coronary heart disease in the UK is estimated to be £7.06 billion, much higher than other recent estimates (Currie et al 1997; Audit Commission 1995; Office of Health Economics 1995). The productivity and informal care costs exceed direct health costs in relation to coronary heart disease. However, the authors' analyses reveal that direct health care costs in the UK are low compared with other industrialised countries.

Johannesson et al (1997) have investigated the cost per year of life gained with simvastatin therapy (lowering cholesterol levels with simvastatin reduces morbidity and mortality in patients with angina pectoris or previous acute myocardial infarction) according to age, gender and cholesterol level before treatment. The costs the authors studied covered intervention and direct and indirect costs related to morbidity from coronary causes. The direct costs analysis reveals that the cost of each year of life gained ranged from $3800 for 70 year old men with 309 mg of cholesterol per decilitre (high level) to $27400 for 35 year old women with 213 mg of cholesterol per decilitre (low level). Including indirect costs in the analysis meant that the cost of each year of life gained ranged from *savings* at age 35 years regardless of gender and cholesterol levels to $13300 for women aged 70 years with low cholesterol levels. These results are more or less in agreement with those arising from work done in the US by Goldman et al (1991).

Considering another form of intervention in relation to coronary heart disease, Gaspoz et al (2002) have investigated the cost effectiveness of the increased use of aspirin, clopidogrel, or both for

secondary prevention in patients with coronary heart disease. They found that increasing aspirin therapy levels to all eligible patients for 25 years (or to death) would have a cost effectiveness ratio of $11000 per quality-adjusted year of life gained, falling to $8000 for those aged 65-84 years.

5.2 Smoking: as an interesting example of intervention and the economics of such, the work of Stapleton et al (1999) evaluating the cost effectiveness of the prescription of transdermal nicotine patches for smoking cessation in general practice can be considered. The authors have estimated the cost-effectiveness of allowing GPs to prescribe transdermal nicotine patches for up to 12 weeks. The benefit is measured in the number of life years that would be saved by stopping smoking at different ages, estimating thereafter the incremental cost per life year saved by GP counselling with nicotine-patch treatment in relation to GP counselling alone. This is an instance where the incremental cost per life year saved increase with increasing age, from £398 for those aged under 35 years, £345 for those aged 35-44 years, £432 for those aged 45-54 years, and £785 for those aged 55-65 years.

5.3 Dementia: according to the Alzheimer Disease Society, there are approximately 700,000 persons in the UK suffering from dementia, and of these approximately 400,000 have Alzheimer's disease. As this disease is age specific, demographic change as outlined in section 2 can be expected to impact on the cost of care. Much of the work done to estimate the costs of caring has been based on cross-sectional data (Gray and Fenn 1993; Bosanquet et al 1998, for example), while there is extremely limited knowledge of life course costs for individuals or groups (Wolstenholme et al 2002). A rather unique study by Wolstenhome et al (2002) reveals that the total cost per patient over a mean period of follow up of 40 months (range 1-132 months) was almost £67,000 on average, with institutional care comprising the main cost component and accounting for 69 per cent of these costs. Respite care, on the other hand, accounts for only 15 per cent of these costs. Perhaps more illustrative is the fact that annual costs per patient ranged from just over £8000 for mild disease to just over £22,000 for severe disease (cognition based on the so-called MMSE (Mini-Mental State Examination) score). Additional costs arising from institutional care are approximately £8000 per 4-month period. The age-institutionalised interaction reveals that each additional year of age reduces care costs by £130 per 4-month period and when cared for in an institution each year of age has the additional effect of

reducing care costs by £147 per 4-month period. This implies – having controlled for disease progression - that older persons at home or in an institution are less likely to have health and social care resources allocated.

In the following, we shall briefly refer to and refer from studies, which have considered the cost effectiveness of interventions in the field of dementia. More detail is obviously available from the full papers (referenced in the bibliography). A total of 43 papers have been addressed. However, most turned out to be not economic evaluations but cost studies, which are not included here.

O'Brien et al (1999) consider the economics of donepezil for the treatment of Alzheimer's disease in Canada. Overall expected 5-year costs per patient in the donepezil group were Can$80,305 compared with Can$81,187 for the placebo group. Healthcare costs were lower in the donepezil group (Can$62,551 compared with Can$63,480), while informal care costs were slightly higher (Can$17,755 compared with Can$17,707). The incremental effect per patient ranged from 0.18 to 0.24 years of severe dementia free life gained. The authors conclude that the use of donepezil in cases of mild or moderate Alzheimer's disease over a 5-year period leads to improved outcomes at a lower cost than standard care alone. However, indirect costs are not included in the analyses, and it is unclear to what extent the results are generalisable.

Hay et al (2002) consider the cost-effectiveness of preventive occupational therapy for independent-living older adults and conclude that the occupational therapy based intervention is cost-effective when compared with generalised social activity programmes or no therapy. Occupational therapy led to gains in quality of life scores (QALYs) and reduced medical expenditure. There is however doubt about the sample being representative, and the follow-up period is limited.

5.4 Falls: Tinetti et al (1994) considered the effects of multifactorial intervention to reduce the risk of falls among older people in the community and they found that the costs of averting a fall that came to medical attention ($12,392) compared favourably with the average medical treatment costs per hospitalisation for injuries caused by falls among older people ($11,800). Intervention comprised exercise and behavioural modification (ankle pumps, hand-clenching, training in transfer skills, removal of hazards, gait training, balance exercises, resistance exercises). There do appear to be major

concerns about certain aspects of the study, however. A similar study by Rizzo et al (1996) revealed that the mean intervention cost per person was $905. In the targeted group the mental health care costs were $2000 less per person, and mean annual health care cost savings were almost $4000 per person among participants at high risk of falling.

The effect of home assessment and modification on reducing falls among independent older people aged 75 and over in Australia was elucidated by Smith et al (1998). On a one year time horizon, the incremental cost of introducing the intervention was Aus$172 per person, while the incremental cost per fall prevented was Aus$1720 and Aus$17208 per injury prevented. The study reveals considerable benefit from the intervention in terms of reduced morbidity, fewer hospitalisations and improved quality of life.

The effectiveness of hip protectors is illustrated by Kumar et al (2000). The incidence of hip fractures per 1000 population per annum was estimated to be 0.13 with no hip protector and 0.05 with a hip protector for those aged 50-59 years, rising steadily to 25.34 with no hip protector and 8.97 with a hip protector for those aged 85 years and over. The average cost of a hip protector was £113 per person per year and the average cost of treating a hip fracture was £7200. The cost per fracture prevented declined steadily from £88,435 per year for patients aged 60-64 years to £2485 for patients aged 85 years and over. There do appear to be some shortcomings with regard to the costs included in the analysis.

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