What models of specialist geriatric care best meet the needs of the population of NHS Highland?
Contents

Introduction .............................................................................................................. 1
Method .................................................................................................................... 2
Results ................................................................................................................. 2

Literature findings in relation to outcomes of specific models of care ..................... 2
1. Models by setting ............................................................................................... 3
   (i) Within hospitals ........................................................................................... 3
       General and historical hospital models ....................................................... 3
       Hospital-wide .............................................................................................. 4
       Generic ........................................................................................................ 4
       Emergency Department Interventions ......................................................... 5
       Acute Geriatric Units ................................................................................ 6
       Comprehensive Geriatric Assessment (CGA) of acute admissions ............. 6
       Geriatric Consultation services in hospital ................................................ 8
       Inpatient rehabilitation ............................................................................... 9
       Geriatric medical service ......................................................................... 10
       Summary of within hospital models of care ............................................. 13
   (ii) Across the hospital-community interface ................................................. 14
       Summary of across the hospital-community interface ................................ 16
   (iii) In the community ..................................................................................... 16
       Day Hospital ................................................................................................. 16
       Nursing / Residential Care Homes ........................................................... 17
       Primary care ............................................................................................... 19
       Patient’s Home ........................................................................................... 20
       Summary of effectiveness of various community settings ....................... 22

2. Models by specific type of care or management .................................................. 23
   (i) For specific conditions ............................................................................... 23
       Chronic Heart Failure (CHF) ....................................................................... 23
       Chronic Kidney Disease (CKD) .................................................................. 23
       Mental Health ............................................................................................ 24
       Hip Fracture ............................................................................................... 25
       Summary of specific conditions ................................................................ 26
   (ii) Mode of delivery ....................................................................................... 26
       Summary of mode of delivery ................................................................... 27

3. Models by type of location .................................................................................. 28
   (i) Meeting the needs of Urban, rural and remote dwelling older people .......... 28
   (ii) Urban, rural and remote-based location of services .................................... 29
       Summary of evidence by type of location .................................................. 30
Overall Summary

1. Models by Setting
   (i) Within Hospital
   (ii) Across the hospital-community interface
   (iii) In the community

2. Models by Specific type of care or management
   (i) For specific conditions
   (ii) Mode of delivery

3. Models by Type of location
   (i) Meeting the needs of urban, rural and remote dwelling older people
   (ii) Urban, rural and remote-based location of services

GLOSSARY

REFERENCES

APPENDIX 1: Search methodology
Introduction

This question is important to NHS Highland for 3 main reasons:

1. The availability of specialist clinicians is limited in NHS Highland. There are 3 WTE Consultant Geriatricians, two serving the population of Highland Council area and one across Argyll & Bute. NHS Highland has the lowest provision of Consultant Geriatricians amongst all Scottish Health Boards (Figure 1) relative to its population of older people and to the number of hospital bed days used by them. Although the figure depicts NHS Highland, the rates are the same for the population of Highland Council. Argyll and Bute is not depicted as it takes up specialist service also from NHS Greater Glasgow & Clyde.

2. The populations served range from the most remote and rural in Scotland to more urban areas, such as Inverness, and small towns.

3. The number of people aged 65 & over is projected to increase by 65% over the next 25 years, comprising a third of the total population and those aged 75 years and over to double in number.

Given the relatively low Geriatric specialist provision, it is not possible for one model of care to be optimal for all populations within NHS Highland. Therefore, it is important to learn from research, which models seem to be most effective in the journey of care for older people in relation to specialist Geriatric resource.

Data sources: Geriatricians as at Mar-31 2012: ISD NHS Workforce report
SMR01 (ACaDMe Comparative): nos. of days of occupancy relating to NHS H residents with a discharge date within the period of 1st April-10 to 31st March 2011
Method

Literature was accessed and reviewed using the following criteria and conditions:

- Published in English language within the last 17 years i.e. 1995 to date
- Priority given to systematic reviews
- OVID databases; Cochrane Library; TRIP database; CRD; Kings Fund; Dr Foster
- Population was Older people (variously described)
- Interventions: Models of care; Geriatric assessment/care (variously described)
- Comparison was usual care in most cases
- Outcomes were: survival; mortality; staying in own home; hospital admissions/re-admissions/emergency admissions; hospital stays; visits to Emergency Department; Mental well-being; Physical well-being

Details of the search are provided in the appendix.

Results

The initial search resulted in 212 publications, 87 of which were extracted from the Cochrane library and included 4 Cochrane Systematic reviews; 66 from the Database of Abstracts of Reviews of Effects, (DARE); 4 Health Technology assessments, (HTA) and 13 NHS Economic Evaluation Database, NHS EED). From these, 53 articles were used and a further 25 as a result of snow-balling from them or as a result of specific ad-hoc searches. Therefore a total of 81 pieces of literature have been used in this review.

The range in the models of care reported upon in the literature could be categorised in the following way:

1. By where they take place (by setting)
   - Within hospitals
   - Across the hospital-community interface
   - In the community

2. By specific type of care or management
   - Condition-specific intervention e.g. hip fracture
   - Mode of delivery

3. By type of location:
   - Urban
   - Rural and Remote

These are not mutually exclusive categories but represent some of the important characteristics/attributes of the types of care available.

Literature findings in relation to outcomes of specific models of care

These are described under each of the 3 categories, each one of which has various sub-categories.
1. Models by setting

(i) Within hospitals

These include:

- Hospital-wide
- Generic
- Emergency department
- Acute Geriatric Units
- Comprehensive geriatric assessment of acute admissions to hospital
- Consultation services in hospital
- Inpatient rehabilitation
- Geriatric medical service

General and historical hospital models

The model in the UK has generally been one in which acute physicians provide care up to the first 48-72 hours of an unscheduled hospital admission of an older person before discharge from hospital or handing over to sub-specialists. This is in contrast to the model in the United States where the consultant physician (Hospitalist) is responsible for the care of the patient for the whole of the patients hospital stay.

A Hospitalist is a physician specialising in Hospital Medicine which delivers comprehensive medical care to hospitalised patients. Both models have been found to be effective; the US model reducing length of stay and costs without compromising quality of care, whereas the UK model is associated also with reduced length of stay and mortality (Wachter RM & Bell D 2012).

These two models are developing differently. The US model has increased its use of Hospitalists, with 70% of US hospitals now employing them and with the Hospitalists filling the gap made by regulations reducing the Residents working time (similar to Specialty Registrars) . At the same time, the UK model also increased its numbers of Acute Physicians and its use of acute medical units.

Whilst there are economic pressures on both sides of the Atlantic, the further expansion of acute medicine to manage an increasing number of older patients with more than one disease is limited as it could only occur at the expense of the sub-speciality workforce. In contrast to the US, there is less flexibility as Consultants have a permanent employment contract with the NHS. It would therefore seem that the role of the Geriatrician in the UK as a generalist physician skilled in the management of older people with multiple illnesses would be more in demand. Supply is not meeting that demand as general internal medicine becomes an unpopular option possibly due to increasing service requirements and out of hours care (Temple RM et al 2012). If the quality of care experienced by patients is to be improved, it is likely to be achieved through generalist medical skills in order to fulfil the requirements recommended by the recent NICE guidance (NICE Guidelines 138, 2012).

Whilst the descriptions below of various models of care are derived from various countries, many of them are based in the health care system in the USA. Therefore, it is important to take into account the contrasting context with which the described models exist.
**Hospital-wide**

Only one review concerned with hospital-wide interventions in the care of older frail people was found, (Bakker FC et al 2011). The authors cited the need for the review on the premise that the specific geriatric care in hospitals which has been found to be effective in improving the outcomes of older patients (e.g. Geriatric specialised wards), are ward or unit-based whilst the majority of patients now in hospitals are older than 65 years and populate most of the wards.

The review searched for comprehensive interventions aimed at improving the care for all frail older patients throughout hospital and assessed 17, (12 RCTs & 5 controlled clinical trials). Amongst the interventions reviewed were: those concerned with structural changes to the environment; geriatric consultation teams; Acute Care for Elders (ACE) units prior to hospital-wide implementation. They concluded that whilst some interventions were associated with positive results, the studies were very heterogeneous and outcomes were not consistently improved across studies.

**Generic**

In contrast there have been a number of descriptive studies and articles on models of generic acute care of older patients. These are not necessarily hospital-wide but are either physical units or programmes of care that patients can be referred to. Most of these are in the US or Canada and include ACE; HELP; NICHE.

One recent article, (Steele JS 2010) described the evidence for such models of care. ACE (Acute Care for Elders) units have been mainly implemented in urban or university hospitals. ACE units provide holistic care and include adaptations to the physical environment appropriate in improving physical and cognitive functioning, multidisciplinary therapy and discharge planning. The article described 6 individual studies (4 RCTs; 2 surveys). Three of the RCTs reported improvements in physical functioning (ADLs) although in the largest study, this difference was not statistically significant. Three RCTs were associated with lower rates of nursing home admissions and in two of the three studies, the differences were statistically significant in the 90 days after hospital discharge. Where costs had been included (3 studies) all had concluded that ACE units were no more expensive in terms of resource use.

Two of these studies concerning ACE units fulfilled the inclusion criteria for a Cochrane systematic review with meta-analysis of acute geriatric units (Baztan JJ et al 2009). The results are described later under the Acute Geriatric Units section.

The HELP programme (Hospitalised Elder Life Program) comprises multiple interventions applied according to individual need during the hospital stay. The elements are designed to maintain physical and cognitive functioning, maximise independency at discharge and assist with transition from hospital to home. The main distinguishing characteristic from the ACE programme is that it does not require specially designed and constructed units as HELP can be implemented in any pre-existing hospital environment. However, some hospitals in the US have implemented the programme in HELP units.

Enrolment to the programme is on the basis of age (=>70y) and one or more risk factors out of 6, (Cognitive impairment; mobility; vision; hearing; dehydration; sleep deprivation). Exclusion is on the basis of inability to participate in interventions, for example due to severe dementia and also if patients refuse enrolment. The interventions are carried out by a multidisciplinary team comprising both professionals and trained volunteers. Members of the team generally include a Geriatrician, a geriatric specialist nurse, a specialist registrar,
programme director and other support staff as required i.e. pharmacist, chaplain, social worker, psychiatric liaison nurse, rehabilitation therapists.

The HELP programme does not appear to have been evaluated by a randomised control trial. Published results on the basis of a descriptive study, a matching prospective clinical trial, a pre-test/post-test study and surveys have been reviewed, (Steele JS 2010). The aim of the two quantitative studies was to prevent delirium and in both studies, the incidence rates were statistically significantly lower with the intervention (35%) relative to usual care.

Both studies, particularly the pre and post-test study are susceptible to confounding. Costs were assessed as being lower over 6 months of implementation in the latter study (Rubin FH et al 2006). However there were some issues regarding the validity of the analysis as per the CRD commentary on the NHS EED database. The prospective clinical trial reported significant improvement in other outcomes including the degree of cognitive impairment among patients with cognitive impairment at admission and a reduction in the rate of use of sleep medications among all patients (Inouye SK et al 1999). The descriptive study and the surveys highlighted some drawbacks with HELP and included adequate staffing, funding and volunteers. Patient adherence to the programme, which was linked to availability of volunteers and staff to implement interventions, patient refusal and patient availability, either physically or due to medical contraindication, were also found to be problematic.

NICHE (Nurses Improving Care for Health-System Elders) can be described as a guide for nursing practice in participating hospitals and aims to achieve systematic nursing change that will benefit hospitalised older patients (Steele JS 2010). Therefore the programme is largely delivered through education. It relies on one of two nursing models: the Geriatric Resource Nurse (GRN) and the ACE model.

The GRN model cascades the knowledge and skills acquired from one nurse trained in specialist geriatric care and provides guidance and support care when questions arise in the care of older patients. The model uses resources such as the Geriatric Institutional Assessment Profile (GIAP). This surveys nursing staff to assess knowledge in care of the elderly. Other resources help to keep nurses up to date in relation to evidence-based care for geriatric patients. The ACE nursing model is that employed in ACE units but it can be implemented in hospitals without an ACE unit.

Two published surveys have been reviewed (Steele JS 2010). The results of a pre-test and post-test survey using GIAP of registered nurses in 8 acute urban located hospitals which had implemented NICHE, suggested improved geriatric nursing environments including institutional values in relation to the care of the elderly and greater availability of resource. The institutional values included valuing the patients input to decision-making and respecting the rights of older adults. The other survey covered all of the 137 hospitals that had implemented NICHE in 2002 with 103 of them responding. Most hospitals reported using the GRN model, best practice protocols and the web-based CPD tool. The most popular tool appeared to be GIAP survey and the GRN model. NICHE was most commonly used to reduce and monitor falls, restraints and pressure ulcers.

Emergency Department Interventions

A Cochrane systematic review (Fealy G et al 2009) assessed 9 studies in which outcomes of gerontologically-informed nursing assessments and referral interventions of older people were made in this setting. The studies were set in various countries one of which was Scotland and included five RCTs and six others including two which were before and after designs. Meta-analysis was not attempted due to the heterogeneity of outcomes but the authors concluded that there is some benefit of using nursing assessment and referral.
interventions for older people attending emergency departments. These were in terms of reduced service use and functional decline but they caution, as did the CRD commentary, that the evidence of effectiveness is uncertain.

A second study described the enhancement of care for older people attending the Emergency Departments in hospitals in Ontario, USA (Flynn DS et al 2010). This model involves the employment of a Geriatric Emergency Management nurse who has a background either in Geriatric or Acute Care. The nurse receives a week’s training and has a remit of implementing interventions particularly appropriate to the care of older people. These included recommending the availability of various staff groups e.g. support workers, Physiotherapists; recommendations on mobilisation, discomfort and risk of dehydration, enhancing cognition, basic hygiene, physical environment and equipment. The nurse also had a role in capacity building through education.

The report noted that communication between community-care providers and the Emergency Department had been improved. Patient and staff satisfaction was also improved. None of these outcomes were quantified in the paper; it’s purpose being to describe how strategies known to be effective within other hospital settings in improving outcomes for older people can be incorporated into processes in the Emergency Department by means of a nurse with a geriatric management role.

**Acute Geriatric Units**

These can be defined as hospital units with their own physical location and structure and run by a specialised multi-disciplinary team with direct responsibility for the care of the elderly with acute medical disorders including exacerbations of chronic diseases (Baztan JJ et al 2009).

A Cochrane review (Scott I 1999) concluded that acute geriatric units, were not associated with advantages in relation to mortality or hospital discharge destination (i.e. home versus long-term care establishments). This was a literature review (without meta-analysis), included 4 RCTs and did not provide a definition of a Geriatric Unit.

In contrast, a more recent Cochrane review, (Baztan JJ et al 2009) which was critically appraised as being likely to be reliable, concluded that the care of those aged 65 years and over with acute medical disorders in acute geriatric units produced a functional benefit compared with conventional hospital care (19% (1-17%, 95% CIs), less risk of decline at discharge, and increased the likelihood of living at home after discharge (30% higher (11-52%, 95%CIs)). The included studies (n = 11) were based on geriatric units of between 10 and 36 beds, provided comprehensive geriatric assessment, standardised instruments of measurements, weekly interdisciplinary meetings and early planning of discharge. They were run by a specialised multidisciplinary team with direct responsibility for the care of the elderly with acute medical disorders including exacerbations of chronic disease. The review did not include any patients requiring admission to a specialty unit such as coronary care or intensive care units. The relevance of these findings is also dependent on the local situation in relation to the availability of specialist units such as stroke or orthogeriatric units as the case-mix of the study population included some patients for which admission to such units would have been appropriate.

**Comprehensive Geriatric Assessment (CGA) of acute admissions**

Models of CGA are found in different health care settings although the key components include (1) multi-disciplinary assessment (2) geriatric medical expertise (3) identification of medical, physical, social and psychological problems (4) plan of care inclusive of rehabilitation.
Three relatively recent reviews were found. One a systematic review with meta-analysis assessed the effectiveness of Geriatric Evaluation and Management Units (GEMU). The authors (Van Craen K et al 2010) defined GEMUs as wards that admit older, frail patients for a process of multidisciplinary assessment, review and therapy. Seven studies were included: 4 in the USA and others in Austria, Germany and Norway. The acute hospital settings included university hospitals, geriatric and community hospitals. In most of the studies, treatment was the same in the control and intervention arms but with the intervention group alone receiving comprehensive geriatric assessment (CGA). The majority of included studies (n = 5) involved GEMUs where there was direct admission from home or from the emergency department rather than indirectly from another unit/ward in the hospital. All participants were aged 65 years and over and were hospitalised for a minimum of 48 hours.

GEMUs in this meta-analysis did not show any statistically significant effect on mortality at 3, 6 and 12 months after discharge. This also applied for the other outcomes of length of stay and hospital readmission. The risk of institutionalisation at 12 months (but not at 3 or 6 months) was lower (OR = 0.78 (0.66-0.92, 95% CIs)) and functional decline at discharge was less (OR = 0.87 (0.77-0.99, 95% CIs)).

The second review was a Cochrane review of the effectiveness of comprehensive geriatric assessment (CGA). The authors (Ellis G et al 2011) included 22 studies all of which were RCTs or cluster RCTs involving in total 10,315 participants in 6 countries. Participants were all aged 65 years & over, had been admitted as an emergency (unscheduled; non-elective) with medical, psychological, functional problems. Studies in which condition-specific organised care (e.g. geriatric orthopaedics), were not included in the review. CGA was defined as a simultaneous multi-level (different domains, e.g. medical, cognitive, functional) assessment made by a multidisciplinary team followed by a management plan that included rehabilitation. The multi-disciplinary team included as a minimum, experienced medical nursing and therapy staff. In the majority of the studies, assessment, management and care was delivered by the team in a specialist unit or ward (n = 15). These included units such as GEMUs and ACE. The other studies were assessments made by a mobile/peripatetic multi-disciplinary team (n = 7). The assessments and recommendations were delivered by the team but the care may or may not have been directly provided by it.

The review assessed studies in which the CGA was compared with usual care such as a general medical ward. The primary outcome measure was the odds of being alive and in their own home at a later point in time i.e. reflected both the risk of not dying and of not being institutionalised. The overall result was a 16% greater chance of being alive and in your own home with CGA (OR = 1.16 (1.05-1.28, 95% CIs) than without CGA at the end of the scheduled follow-up which had a median period of 12 months. This equated to the number needed to treat (NNT) to benefit from CGA of 33. At a median of 6 months follow up the respective benefit was 25% (OR = 1.25, (1.11-1.42, 95% CIs) with a NNT of 17. The effect was more pronounced for ward-based provision of CGA where the NNT was lower at 20 at an average follow-up period of 12 months. The effect on the primary outcome at 12 months was consistently seen in trials where there was a dedicated ward providing CGA and subgroup analysis indicated that the benefits arise solely from the trials of geriatric wards. Other outcomes significantly improved were cognitive function, death or dependence and death or deterioration—these two latter outcomes were not significantly different on a singular basis.

Costs were not included in the meta-analysis and most studies only considered direct costs (i.e. excluded the savings that may arise from avoidance of nursing home accommodation and reduced dependence on paid support). Most studies reported the same and if not better cost-effectiveness from CGA in a hospital setting. The authors provide some explanations for the better outcomes of specialised ward provision of CGA, some of which is analogous to those put forward for the effectiveness of stroke units.
The second review was not able to assess any possible differences between the effectiveness of CGA delivered in the acute phase e.g. direct admission from home or emergency department as opposed to those from other hospital wards with patients in the post-acute phase. The third review (Conroy SP et al 2011) aimed to assess whether this had an implication on the effectiveness of CGA taking into account that currently the main setting for admitted older people requiring acute care is an acute medical admission unit (AMU) in the UK. The importance of assessing the evidence for this was the observation that a half of older, frail patients discharged home within 72 hours from acute hospital settings (general units/wards) are readmitted and one third die within 12 months (Woodard J et al 2010).

This third systematic review included RCTs in which patients had been admitted to acute care and who had been treated or assessed and discharged either immediately or within 72 hours. These patients had then received CGA (i.e. in the post-acute phase) in the emergency department or in the acute medical admissions Unit. The review did not find any trials discharged from AMUs and therefore the 5 trials included in the review were on patients aged 65 years and over who had been discharged from Emergency departments in urban hospitals within 72 hours of presentation. In two of the trials, the CGA was Geriatrician-led on cognitively intact patients in an outpatient setting or a Geriatric day centre. The other three trials included patients receiving nurse-led, Geriatrician-supported CGA in the emergency department. The results of the review revealed no clear evidence of benefit for CGA in terms of mortality, re-admissions, subsequent institutionalisation, functional ability, quality of life or cognition. The CRD commentary and the authors had concluded that there had been few trials carried out and that the overall quality of them was poor.

Interestingly and not inconsistent with findings in the third review, CGA in the outpatient setting has not been associated with better survival outcomes although functional status benefit in frail older people has been reported (Kuo H et al 2004).

**Geriatric Consultation services in hospital**

This is defined as a systematic service in contrast to within hospital referral made on an individual case basis by other professionals.

All of the trials reviewed in the effectiveness of comprehensive geriatric assessment excluded condition-specific care. Whilst there was clear evidence for the effectiveness of designated geriatric units/wards, there was no similar supportive evidence for geriatric care provided as a visiting geriatric specialist team in the hospital. (Gray L 2007). However, a recent retrospective cohort study comparing a mobile geriatric specialist team (MACE, the mobile version of an acute care for the elderly previously described as ACE) to the care of matched patients received in general acute care or ACE units, reported statistically significant benefits in terms of reduced length of stay and costs without changes in mortality or readmission rates (Farber JI et al 2011). This was based in an urban teaching academic hospital in New York and is currently being evaluated within a clinical trial.

There is also some evidence associated with such services where there is a specific goal for the intervention. Avoidance of delirium is one such example where this would reflect better quality of care. One evaluation of the HELP model, previously discussed in the generic/hospital-wide section, reported a reduction in the incidence of delirium in addition to others, as an outcome, (Rubin FH et al 2006). Another study, a matching prospective clinical trial, used a multi-component strategy in the management of 6 risk factors for delirium and also found a significant reduction in its incidence, (Inouye SK et al 1999).
Most of the evidence for Geriatric consultation is for patients with specific conditions particularly orthopaedic-related problems. There is some evidence that systematic involvement of Geriatricians at an early stage in the management of older people admitted to hospital with hip fracture is beneficial in terms of length of stay and in independency as measured by discharge destination (Elliot JR 1996). This compared the outcome to standard care where Geriatrician involvement was on the basis of within hospital referral on an individual case basis. This was a single study in a secondary care setting in New Zealand which compared outcomes of patients aged 65 years and over admitted to one of two wards with fractured neck of femur. The intervention was provided to one ward and consisted of a geriatrician reviewing all patients and regularly inputting to the care of patients with co-existing medical problems. Standard care was provided to the other ward as a consultation-only service i.e. cases by case referral to a geriatrician. A multi-disciplinary team also provided discharge planning and where appropriate patients received rehabilitation in a rehabilitation ward for patients in both wards. Outcomes in terms of reduced hospital lengths of stay and discharge destination to own home were significantly better in the intervention arm. However this was a single study published 16 years ago.

A more recent pre-post design study based in a community hospital in the USA (Miura LN et al 2009), measured the outcomes of 91 patients with acute hip fracture who had been admitted to a geriatrician-led hip fracture programme. When compared to 72 historical controls who had received standard care, the length of stays and time to surgery were both significantly shorter with one half receiving surgery within 24 hours compared to 22% in the control group. The programme was also cheaper in terms of total costs. The patients were mostly admitted via the emergency department but included some transfers from other hospitals. The programme involved the Geriatrician as the primary attending physician with the orthopaedic surgeon as the consulting physician. These results may suggest a benefit but there is the potential for confounding due to the study design.

A prospective observational study with a retrospective control cohort based in a large hospital in Australia (Fisher AA et al 2006) compared the outcomes of 951 patients aged 60 years and over, originally admitted with a non-pathologic hip fracture over a 7 year period. The control period (3 years) involved Orthopaedic-only care with any Geriatric medical input provided by a consultation-only service. The intervention period (4 years) consisted of daily medical care being overseen by a geriatric medical registrar with a weekly review by a consultant geriatrician. Significant improved outcomes of patients under geriatric medicine co-care were in-hospital mortality, post-operative medical complications and re-hospitalisation to medical wards within 6 months. No differences in length of stay or the proportions discharged to institutions or home. However, as in the previous study there is potential for compounding factors over the timescale such as improvements in surgical procedures.

**Inpatient rehabilitation**

A recent Cochrane systematic review (Bachmann S et al 2010) concluded that both short (at discharge) and long (3 to 12m after discharge) term outcomes of admitted older patients were better when they received rehabilitation specifically designed for geriatric patients compared to usual care.

Rehabilitation team members included combination of Geriatrician; nurse OT; PT: psychologist; dietician; social worker, Pharmacist; Orthopaedic Surgeon; speech therapist, rehabilitation specialist. 17 RCTs were included in the review of which around one half was concerned with general geriatric rehabilitation and the other with orthopaedic geriatric rehabilitation after a hip fracture.
Overall the short-term increase in functionality was 75% higher (OR=1.75 [1.31-2.35, 95% CIs]); a 36% lower risk of nursing home admission (OR=0.64 [0.55 – 0.95, 95% CIs]) and a 28% lower mortality (OR = 0.72; [0.55-.95, 95% CIs]). Within these results, orthopaedic rehabilitation programmes compared to general geriatric rehabilitation was significantly more effective in improving short-term functioning and the effect of geriatric rehabilitation on lowering the risk of nursing home admission was greater in those under the age of 80. In the longer term, there were also statistically significant improvements in all three outcomes although the magnitude of them were smaller. There was again a greater impact on the functioning outcome from orthopaedic rehabilitation programme compared to general rehabilitation programmes.

The numbers needed to treat (NNT) were estimated to be between 9 and 28 to avoid one admission to nursing home at discharge and between 21 and 63 at follow-up. The NNT to prevent one death at 12 month follow-up was 38 using an assumed 20% one year mortality rate for controls. These values are on a par with the most effective types of medical therapy such as thrombolysis in preventing death or further cardiovascular events.

**Geriatric medical service**

There appears to be several existing models whereby Medical Geriatric expertise is provided at the acute hospital level. These are variations on two themes (Aitken M 2008):

1. The Geriatrician as a passive member of the specialist team overseeing the ongoing management of those patients in whom a speedy return to the community is problematic i.e. a consultative input provided on request by acute specialists

2. The Geriatrician taking control of the management of the patient on arrival to hospital

In addition, the Geriatrician in the UK may have access to community hospital beds which act as an intermediate setting of care between the acute hospital and the community.

The question remains as to what model best fits the local situation in terms of availability of geriatrician expertise and how effectively it can be used. Another question is what the preferences of patient/family/carers might be.

Whilst the previous sections concerned the review of the effectiveness of existing models of care, the results of which are summarised in the next section, there is very little published evidence in relation to the preferences of patients and their family and carers in relation to acute hospital care.

A study (Sorbero ME et al 2012) based on the analysis of secondary care data pertaining to the discharge of elderly patients (n = 12,250, aged 65 years and over), from two hospitals in the US, compared efficiency measurements between patients whose management had been by a Geriatrician and those who had been managed by a non-geriatrician (usually a primary care physician within the hospital).

Patients were matched between the two types of care on the basis of propensity scores, (socio-demographic and clinical characteristics which would be expected to affect the outcome of a patient; e.g. demographic, place from where admission made; types of co-morbidities). All had been admitted in a medical diagnostic-related group (DRGs) with exclusions of those with a stroke although those with TIAs were included. Patients under Specialist doctors care were excluded as these patients were likely to have conditions less common in their case-load e.g. cardiac catheterisations.
Comparison of the study cohorts revealed those under Geriatrician care to be older, more likely to be female, to have a greater number of co-morbidities, and to have been admitted from a nursing home. After matching on propensity scores, patients under Geriatrician care had statistically significantly shorter lengths of stay with no difference in the other outcomes of in-hospital mortality, mortality at 30 days or re-admissions at 30 days. These findings were also seen without matching on propensity scores. The cost per day was more expensive in the Geriatrician cohort, but cheaper overall when the shorter length of stay (difference in the average LOS of 1.1 day) is taken into account.

The authors considered several possible explanations for the shorter length of stay including the chances of earlier discharge to nursing homes for those originally admitted from them rather than from other community settings, due to the requirement of Nursing Homes to hold a patient's bed for up to 15 days. However, this was discounted due to the greater length of stay associated with this group of patients. Unfortunately there was no sub-analysis of the data presented to compare this cohort of patients between the two types of care to validate this conclusion although the authors noted that the results (not shown) were still robust when admissions from nursing homes had been excluded from the multi-variant analysis. Another explanation favoured by the authors is the greater likelihood of Geriatricians identifying conditions that non-Geriatricians may overlook. These conditions are likely to be associated with functional decline if not identified and managed at an early stage. The finding that patients of geriatricians had more diagnosis of malnutrition, delirium, anaemia, dehydration and psychiatric problems than did those under the care of non-Geriatricians supports this explanation. A third explanation is that many of the patients admitted under the care of the Geriatrician had also been managed by them as outpatients. Although this would also be true for the cohort cared for by the non-Geriatricians, it might be that the Geriatrician in the outpatient setting manages the patient better to avoid fewer complications when hospitalised. Yet another explanation is that Geriatricians prefer to undertake most tests in the outpatient setting and focus on the primary concern when hospitalised in keeping with patients' preferences.

The generalisability of these findings is an issue. Firstly because it relates to two hospitals in a country with different medical care arrangements and secondly it excludes patients who have received hospital care for some specialist interventions such as cardiac catheterisation. Nevertheless the possible explanations of the differences in Geriatrician and non-Geriatrician management are potentially relevant to the local situation and worthy of further investigation.

Evidence for the most effective models of care in terms of patients and their families and carers was remarkable in its relative absence from the published studies. Two randomised Control Trials of ACE units in the USA reported improved provider and patient satisfaction rates. An effectiveness report on ACE units (Allen K & Turner T 2008), cautioned interpretation of these ratings due to the uncertainty of the validity of the outcome measures used.

A literature review on the best practice interventions for older people in the acute hospital setting (Hickman L et al 2007) noted that Geriatrician-led multi-disciplinary teams in specially designed units were associated with improved medication status of patients in terms of unnecessary medication; inappropriate and under-medication. The overall conclusion of the review was that interventions delivered by clinicians with gerontological expertise and in dedicated settings improve outcomes.

The other model is where there is co-management of older patients with specific conditions in hospital. A health technology assessment (HTA) which reviewed the evidence for the effectiveness of specialist geriatric services in various settings (Day P & Rasmussen P 2004) concluded that in relation to inpatients with acute/sub-acute illness, stroke units, in which
there was comprehensive acute and rehabilitation care, were associated with mortality and discharge to home advantages over those with stroke managed out with a stroke unit.

Advantages of reduced lengths of hospital stay, home discharge and cost-effectiveness were associated with geriatric hip fracture programmes where there was early supported discharge home programmes with integrated (hospital to community) rehabilitation care were also concluded in the HTA. A more recent review specifically concerned with three different orthopaedic-geriatric models and their effectiveness (Chong CP et al 2009), concluded that joint acute orthopaedic and geriatric care within the hospital setting of older people mainly with hip fractures, (most of the evidence has been published for these patients), are generally associated with better outcomes of function, survival, complications and length of stay, although these were variably demonstrated between studies. Improved outcomes are likely to be the result of early identification and management of co-current conditions, promotion of early mobilisation, avoidance of delays in rehabilitation, co-ordination of discharge planning and more use of preventative interventions such as anti-osteoporotic therapy. The definition of this type of care for the review was the incorporation of a geriatric team in the management of acute orthopaedic patients. The team was multi-disciplinary, inclusive of doctors, nurses and allied health professionals.

A second model was hospitalist care of orthopaedic patients, either elective or acute in the USA. This involves the hospitalist as a physician, managing the patient in the pre-, peri-, and post-operative phases. On the basis of a few studies, length of stays were either reduced or similar, mortality and re-admission the same, reduced time to surgery, in one study, delirium was more frequently diagnosed by the hospitalist, and in another, a preference by surgeons for this model.

A Royal College of Physician review (Dhesi J 2010) described a model that is more likely to improve the outcomes in older people undergoing elective surgery. It has been estimated that one in five patients aged 70 years or more undergoing non-cardiac surgery, develop one or more serious post-operative complications (Dhesi J 2010). The excess is likely to be due to medical as opposed to surgical complications as has been found for older patients undergoing colorectal surgery (Colorectal Cancer Collaborative Group 2000). The prime risk factor for poorer post-operative outcome is co-morbidity, particularly ischaemic heart disease, heart failure and arrhythmia. Age seems to be an independent risk factor for surgical site infection and respiratory failure.

The review describes the inadequacy of current practice for the older surgical patient, in identifying and managing the risk factors for adverse surgical outcomes. The effectiveness of pre-assessment is enhanced if it involves comprehensive geriatric assessment by a multi-disciplinary geriatric care team. This team concentrates on those with functional dependence and multiple co-morbidity and manages the pre-assessment and hospitalisation periods. This model termed POPS (Proactive care of Older People undergoing Surgery), has been implemented in Guys and St Thomas’ Hospitals in London, and has the following care pathway:

1. Pre-operative assessment: comprehensive and multidisciplinary (medical/nursing: Physiotherapy/Occupational Therapy/ Social worker)
2. Hospitalisation: Surgical ward rounds by geriatrician & specialist nurse; Ward-based multidisciplinary meetings; education for surgical nursing and medical staff
3. Community: Use of intermediate care services and follow-up services of Physiotherapy/Occupational Therapies; medical and health promotion.

The effectiveness of POPS has been reported on the basis of a pre and post implementation evaluation of the model as reducing the length of stay and post-operative medical
complications and improved mobility in patients under-going elective orthopaedic surgery (Harari D et al 2007).

A similar model in Singapore in relation to patients aged 75 years and over, undergoing major colorectal surgery, has also been described (Tan KY et al 2011). This Geriatric Surgery Service (GSS) is based in one hospital and consisted of a multi-disciplinary team of Geriatrician, Cardiologist, dedicated Nurse, Anaesthetists with a special interest in Geriatric patients, Surgeon, Physiotherapist, Dietician, Pharmacist, medical Social Worker, Befriender. This team collaboratively managed patients in the pre-assessment, peri-operative and post-operative phases. The evaluation used prospectively collected outcome data in relation to patients managed by the GSS (n = 29) and retrospectively collected data in relation to patients managed out-with GSS (n = 52). The evaluation period was 3 years. There was no detail as to how patients were selected for the two different types of management. Two types of pre-operative patient risk scoring were used; one used the American Society of Anaesthesiologists (ASA) and the other for the mortality risk for colorectal surgery (modified Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity (POSSUM)) for colorectal surgical outcome.

The scores for the GSS and standard service groups were similar for ASA but higher in the GSS group for the POSSUM score although not statistically significantly so. Outcomes measured were length of stay, mortality at 30 days post-surgery, and major complication rate. All these were favourable for the GSS group but statistical analysis as not presented, presumably due to low numbers. The proportion returning to functional level (ADL Barthel scores), at 6 weeks post surgery and the proportion who were satisfied with care were also measured but only in the GSS group where they were 85% and 100% respectively. Although this study had important methodological limitations, it is supportive of prior identification of problems and appropriate management of them before and around major surgery in avoiding adverse events.

**Summary of within hospital models of care**

- The context for the within hospital models, contrasted between the one predominantly existing in the USA of management by a Hospitalist (Generalist), and the one in the UK of the Acute Physician to sub-specialist care. The recent guidance by NICE appears to require a generalist skills approach to the care of the elderly in the acute hospital.
- Very few hospital-wide models were described and evaluated and those that were, were associated with insufficient evidence for effectiveness.
- The generic hospital models of acute care included a variety of units or programmes aimed at maintaining and improving physical and cognitive function. Some programmes were based on nursing arrangements and education. Apart from the ACE units, the evidence for effectiveness was insufficient.
- There was insufficient evidence for the effectiveness of geriatric-specific assessments (mainly by nurses) in the emergency department setting. Studies were based in various countries. Some outcomes were described as being improved such as communication between community care and patient satisfaction but these were not quantified.
- There was recent satisfactory evidence for the effectiveness of acute geriatric units for functional outcome and for being discharged to home. These benefits applied to patients cared for in designated units but excluded patients who would otherwise be managed in a specialty unit such as coronary care or intensive care and so the generalisability of these units needs to be considered.
- There was some satisfactory evidence that comprehensive geriatric assessment of patients admitted as an emergency with medical, psychological or functional problems was associated with a greater chance of being alive and discharged to own
home at 6 months (25% higher) and 12 months (16%) after discharge. These benefits equated to numbers needed to treat (NNTs) of 33 and 17 respectively. Ward-based provision appeared to be effective as opposed to evaluation delivered by a mobile team or in a non-dedicated facility. In contrast, comprehensive geriatric assessment was not found to be effective in the post-acute phase although this evidence remains inconclusive as it was based on a small number of studies.

- There is some evidence that Geriatric consultation services when not in the form of specific referral from other clinicians, may be effective when it is in the form of a mobile team or when it has a specific aim such as the avoidance of delirium or at an early stage in the management of those admitted with hip fracture.
- There is satisfactory evidence that in-hospital geriatric-specific rehabilitation is effective in increasing functionality and in reducing discharge to nursing home. Orthopaedic relative to general geriatric rehabilitation was more effective in these outcomes for those aged under 80 years with NNTs ranging from 9 to 28.
- Several models of Geriatric Medical Services exist from a reactive one to one in which the Geriatrician oversees the management of the patient. Within hospital care, there was evidence suggesting that patients under Geriatrician care as opposed to standard care had shorter length of stays even though the case-mix was older and frailer. Amongst the explanations put forward for this finding was the relatively greater diagnosis of conditions likely to compromise recovery such as malnutrition, dehydration, delirium, anaemia, psychiatric problems associated with the cohort of patients under the care of the Geriatrician. Another was the likelihood that the Geriatrician cohort of patients was previously managed as outpatients which predisposed the patients to experience fewer complications when hospitalised. A wider review noted that Geriatrician-led multidisciplinary teams in specially designed units were associated with better outcomes including that of medication status (unnecessary, inappropriate and under-medication). Co-management of patients with specific conditions such as orthopaedic or stroke have also been reported to be associated with better outcomes including shorter length of stay, survival, complications and function. This appeared to be the case in terms of hospitalist care pre- and post-orthopaedic surgery in relation to time to surgery and the avoidance of the incidence of delirium.
- Patients undergoing elective surgery are reported to have better outcomes when managed in a geriatric-specific programme as per POPS in London. A similar model has been described for patients undergoing major abdominal surgery (Singapore).

Overall, for hospitalised patients, better outcomes for patients were associated with care delivered by geriatric-specific and multi-disciplinary teams, particularly when these were delivered in designated units or wards. In-hospital geriatric-specific rehabilitation particularly of orthopaedic patients was also effective. In contrast, there was little evidence to identify which type of model might be most effective in terms of patients, carer and family/friends satisfaction.

(ii) Across the hospital-community interface

This is variably defined in the literature. In terms of interventions, there is a plethora of reviews and primary studies evaluating these. They come with different labels amongst which intermediate care and transition care are the commonly known. Intermediate care was included in a previous report which reviewed the effectiveness of interventions to reduce hospital admissions in the elderly

(http://intranet.nhsh.scot.nhs.uk/Org/CorpServ/PublicHealth/Epidemiology-HealthSciences/Pages/PublicationsResources.aspx).
The interventions which evaluated favourably were Nurse-led units and discharge planning to home scheme, both reducing the frequency of re-admissions to hospital. The evidence for transition care is confounded by the complexity and variation in the interventions that come under this label. For example, Australia has implemented a national programme entitled the Transition Care Program (TCP). It has been nationally evaluated (Flinders Consulting 2008). TCP is a flexible form of care for frail older people at the end of an inpatient hospital episode. The programme is time-limited and uses goals required to restore functional capacity and help families make arrangements for long-term care. The TCP is provided in 3 types of services: Community-based; residential-based or a combination of these two. Compared to patients who qualified for the programme but who were not included in it, patient and carers satisfaction ratings were higher and for the community-based services, readmission rates and rates of admission to residential care were lower within 6 months. However, although there was reference to assessments and interventions being carried out by multi-disciplinary teams, any specific input by physicians or geriatricians was not detailed in the evaluation report.

Yet another variation is the Geriatric Floating Interdisciplinary Transition Team (Geri-FITT) model operating in some USA hospitals. This has been described and evaluated as a pilot cohort study (Arbaje Al et al 2010). It consists of a Geriatrician and a Geriatrician Nurse Practitioner team that assesses hospitalised patients, co-manages geriatric syndromes, provides staff education, promotes patient self-management, communicates with primary care providers, and follows up with patients and carers (telephone) soon after discharge. The latter two actions are carried out within 48 hours of discharge and the same healthcare professional team provides the inpatient and the transitional care of the patients.

The evaluation consisted of a survey of patients or carers using the three item Care Transitions Measure. The latter measures the patients/carers understanding of the purpose of the medication, whether their preferences were taken into account before the health care plan was decided on; and the degree of understanding they had of their responsibilities in relation to managing their health. The study involved patients aged 70 years or over (n =717) from 4 General Medical units in two hospitals. In comparison to the standard care in the other two units, those under Geri-FITT were associated with greater patient satisfaction and higher quality care transitions although these differences were not statistically significant.

An RCT in Germany randomly assigned patients aged 65 years and over who had been admitted with acute illness from home to a geriatric hospital to receive one of three managements: comprehensive geriatric assessment (CGA) only, CGA with post-discharge intervention; or usual care (control). (Nikolaus T et al 1999). The post-discharge intervention consisted of treatment by an interdisciplinary home intervention team in hospital and then post-discharge follow-up. CGA was only undertaken on patients when in a stable medical state. The interdisciplinary team consisted of an occupational therapist, social worker, physiotherapist and a secretary and worked closely with the hospital staff and the primary care physician. Treatment included promotion of self-management and mobility assessment and management for an average period of 7.6 days. At least one visit was made within 3 days of discharge and then a follow-up visit made at 3 months. Data was also collected by telephone one year later. Of 545 patients, those randomised to receive CGA and the intervention were associated with shorter length of stays and a reduced rate of immediate nursing home admissions compared to the control group. There was no difference in the rate of readmissions or survival but readmissions were associated with shorter length of stays. Direct costs were lower in the intervention group and functional capacity higher.

In contrast a systematic review (Parker G et al 2000) of models of care for patients at the interface between acute hospital and community care did not result in identifying any particular one as being more effective than usual care other than a stroke unit or in-patient rehabilitation. Significantly reduced rates of mortality at follow-up and significantly higher
rates of discharge to home rather than to an institution were associated with both the latter two models. Nurse-led beds, early discharge and Geriatric assessment/treatment unit were also significantly better for discharge to home destination. Day hospital as a transition model was not associated with an improvement in either mortality or rates of institutionalisation and this concurs with results reported elsewhere for this setting, (see next section on Day Hospital).

A Health Technology Review (Ali W & Rasmussen P 2004) could not recommend any one particular model for managing the hospital/community interface for older people other than those that support the continuum of care requiring a high degree of collaborative, multidisciplinary and interdisciplinary care.

A second review emphasising the current situation in the UK of Geriatric care (Conroy SP et al 2011) previously cited under CGA section also indicated a need for good quality research to identify the best model for the hospital/community interface.

**Summary of across the hospital-community interface**

- Models of care at the interface are variously labelled, most commonly as transition care or intermediate care. Most of the evidence has come from the care in the post-acute phase.
- There is some evidence but not statistically supported, that there may be better patient/carer satisfaction with promotion of patient self-management and understanding of medication and care from one model set in the USA (Geri-FITT) in which the intervention was throughout a patient’s hospital stay and included follow-up after discharge by telephone and by communication with primary care providers within 48 hours of discharge. The intervention was undertaken by a Geriatrician and Geriatrician nurse practitioner.
- A similar model was evaluated in Germany although medical input during the hospital stay was not clearly described. The model involved a multidisciplinary team which followed up post-discharge. Outcomes included shorter lengths of stay and lower rates of immediate discharge to nursing home.
- There was no evidence to support Day Hospitals as being an effective setting for transition care.

Overall, there appears to be some evidence that patient outcomes may be improved in the transition phase but it is not clear in terms of what specific health professional input is effective. There is no evidence for the effectiveness of Day Hospital in transition care.

(iii) In the community

Settings include Day Hospital; Nursing Homes, residential care establishments, Primary Care and Patients’ home.

**Day Hospital**

The evidence for the effectiveness of rehabilitation in day hospital has been covered previously. There does not appear to be any research findings to establish that these improve patient outcomes over and above other settings of rehabilitation and it may be associated with poorer outcomes in terms of mortality and costs (Parker G et al 2000).

This finding is consistent with a more recent Cochrane Systematic Review of medical day hospital care for the elderly versus alternative forms of care based on 13 trials and 3,007 participants (Forster A et al 2008). Outcomes of mortality, disability and institutionalisation
were compared with those receiving alternative forms of care (comprehensive elderly care; domiciliary care; no comprehensive elderly care). There was no advantage in any of the outcomes between day hospital care and other forms of care. Disability of survivors was the single outcome that compared favourably for day hospital care versus no comprehensive elderly care. Assessment of resource use however was in favour (non-statistically) of day hospital on the basis of hospital bed use and placement of survivors in institutions compared to no comprehensive care.

A Health Technology Assessment (Day P & Rasmussen P 2004) also concluded insufficient evidence to demonstrate efficacy associated with specialist geriatric services delivered in day hospitals over and above that delivered in other settings.

In contrast, an economic evaluation of a geriatric day hospital in an urban area of Canada (Tousignant M et al 2003) reported a statistically significant advantage of it in terms of improved functional autonomy. However, the control group was based on another study published in 1996 and as the CRD commentary noted, there was no information provided on the characteristics of the study group and what its usual care consisted of which seriously limits interpretation of its relevance to other settings.

Interestingly, all consultant Geriatricians (n =58) and specialist registrars in geriatrics (n = 36) in Ireland together with some GPs (n = 20) were invited to participate in an on-line survey (O’Hanlon S & Liston R 2009). The survey was to elicit the views on the role of community Geriatricians. The majority of respondents (78%) considered that the Day Hospital should be the remit of Community Geriatricians.

**Nursing / Residential Care Homes**

Very few studies with a focus of geriatric specialist interventions in these settings were identified. There was one RCT set in the UK which assessed the value of specialist clinical assessment of older people prior to entry into care homes (Challis D et al 2004). This was based in two areas in the North of England and involved the randomisation of older people at risk of care home entry to usual assessment or to specialist clinical assessment. These people had been previously referred to social services for their care to be arranged by a team of care managers and were now being assessed for substantial levels of care with active consideration for residential nursing home placement. The participants were randomised to usual care management assessment (n = 127) or to clinical assessment (n = 129) by a geriatrician or old-age psychiatrist (at consultant or specialist registrar level). Usual assessment sometimes involved either a District Nurse or a Community Psychiatric Nurse as a further assessment before a decision would be made for care home placement or the provision of a complex home care package.

All assessments were domiciliary and lasted an hour. The specialist Geriatricians made structured reports to the Care Manager regarding diagnosis prognosis and recommendations of treatment management. The person’s GP was also contacted regarding the assessment findings and recommendations. In the experimental group, a number of newly identified clinical conditions, most of which were cognitive impairment were identified by the specialist clinicians over and above those already known to the Care Manager. In addition there was statistically significantly less deterioration in their physical functioning, had fewer contacts with the emergency service or nursing home and carers experienced reduced levels of stress within the 6 month period after assessment. The proportions actually placed in nursing homes by 6 months after assessment was 42% in the experimental group and 47% in the control group and were not statistically different. However, estimated service costs were lower in the experimental group even when including the cost of a specialist’s time. This was due to the significantly lower number of nursing
home days spent and the fewer visits to A & E during the 6 months after specialist clinical assessment.

An example of a specific intervention in Nursing Homes by specialist geriatric service is an evaluation of a review aimed at reducing adverse effects caused by polypharmacy and inappropriate medication (Tamura BK et al 2011). The review had been undertaken by Geriatricians and Geriatric Medicine fellows in a Nursing Home in Hawaii, which compared the medication details of 160 nursing home residents against Beers criteria and Epocrates online drug-drug interaction resource. Recommendations of any changes as a result were made to the Primary Care Physicians for endorsement and then a review of the effects on the subsequent medication of these individuals. 74 out of the 160 were found to be on 9 or more medications (the definition of poly-pharmacy). After the review there were statistical significant reductions in the average number of medications per patient and in those in the categories of scheduled; pro re nata; high risk; contraindicated; potential drug-drug interactions; no indication.

In the UK, according to the Royal College of Physicians, Geriatricians have become disengaged from care homes over the last 20 years (Steves CJ et al 2009). In 2000, the Royal Colleges of Physicians and Nursing with the British Geriatric Society issued guidance but important deficiencies still exist with an expressed need for more specialist involvement.

Two articles were found in relation to geriatric-specific training associated with care homes. The first one was an evaluation of the learning outcomes of a postgraduate training course in community geriatrics for primary care doctors based in Hong Kong (Lam TP et al 2011). This is described in more detail in the Primary Care section. Nursing Home visiting had been described as difficult in the pre-course evaluation and there was little change observed in the frequency of nursing homes visits after the course.

The second article was a narrative review (McGilton KS et al 2009) assessing the effectiveness of communication training of healthcare providers (n= 426; nurses and nursing assistants) working in residential institutions. Most of the studies included were based on nursing homes with an average age of participants of over 80 years (n = 399). Outcomes, measured were knowledge and behaviour of healthcare providers, and observed behaviour of residents. All studies had reported an improvement in these outcomes and a decrease in negative communication and interactions. However due to the possibility of publication bias and the limited detail of the results and the small number of studies (n =6), the CRD commentary noted that the conclusions should be interpreted with caution.

In contrast to the paucity of studies in care home settings involving Geriatrician input, there were some concerned with models of care either based on training or support of other health care providers or on specific nursing care programmes. A review of models of care for older adults with chronic conditions in the US included 6 studies (1 x RCT + 5 x Quasi-experimental) evaluating the quality of care in nursing homes (Boult C et al 2009). The intervention was the input of primary care provided by Advanced Practice Nurse (APN) or a Physician’s Assistant (PA).

The remit of these professionals was to assess the patient every few weeks, train the Nursing Home staff and recognise and respond to early signs of deterioration, communicate with family and treat the patient in the nursing home. The most common model was one where the APN or PA works in partnership with a physician who is skilled in long term care and provides supplementary care as needed. The programmes have shown an improvement in the quality of care and to reduce patients’ use of hospital and emergency services. However this was a narrative review and the programmes were based in a different health system (USA).
Two studies were found in which various nursing models were evaluated, both were based in the Netherlands. One of these, (Boumans N et al 2005), evaluated the effects of implementing a nursing model (resident-orientated care as opposed to task-orientated care), delivered by primary care nurses in three nursing homes. The participants of the Homes were a mixture of those with somatic or with psycho-geriatric problems. The outcomes evaluated included aspects of quality of care such as co-ordination of care, instrumental aspects, expressive aspects, resident well-being and satisfaction and family satisfaction with care. Resident-orientated care has four elements: (i) assignment of patients to an individual nurse (ii) use of the nursing process (tasks) (iii) extension of the tasks (iv) improved communication. Although there were methodological issues, the effects on patient and family satisfaction of care and on patient well-being were not found to be improved. There was improvement in the co-ordination of care affecting around one half of the patients and possibly an improvement in the expressive aspects.

The second study evaluated a form of the Resident Assessment Instrument (RAI) in various Nursing Homes in Holland (Achterberg WP et al 2001). The RAI was originally developed in the USA to improve the quality of care in its nursing homes. Since then it has been adopted by other countries (Japan, Canada, Sweden and various European countries). It uses a minimum data set, an assessment tool of needs in various domains and some Resident Assessment Protocols (RAPs) which are triggered as a result of the results of the assessment tool.

The study was a quasi experimental design of participants in 7 Nursing Homes covering nine wards which planned to implement the RAI. Controls were obtained from wards within these nursing homes when the RAI was planned to be phased in (n = 4) and from other matching nursing homes (n = 5) where there was no phased approach. Participants (n=398) were residents that had been admitted for long-term care where their remaining expected length of stay was over 9 months. They were somatic patients i.e. not psycho-geriatric or patients admitted for rehabilitation or with terminal illness, and able to understand simple questions and to give informed consent for their inclusion to the study. Data was collected 1 month before and 8 months after implementation of the RAI.

On the basis of comparisons with the control groups, implementation of RAI had statistically increased the taking of case history with non-statistical improvement in other scores. The increase in the overall rating was statistically higher with RAI implementation.

The degree to which RAI or similar nursing models of care are implemented in the UK is not known. A short article outlined the case for achieving a national standard assessment instrument in UK care homes and promoted RAI as one possible model (Challis D et al PSSRU Bulletin October 2002).

**Primary care**

The optimal role of Geriatricians in Primary Care is unknown and it presumably depends on the local situation in terms of service provision and the geography of the area. An intervention in the form of an outreach Geriatrician clinic based in two Primary Care practices in the USA has reported to reduce hospitalisation and costs of health care (Fenton JF et al 2006). This was a retrospective cohort study using propensity scores (2:1, controls to cases) to compare with matched controls (from two other Primary Care centres. Patients were aged 65 years and over and had a high rate of Outpatient visits within the previous year (this was part of the propensity score). The intervention consisted of invited patients (n = 146) making an initial visit in which the Geriatrician assessed the patient for risk factors for functional decline. The second visit involved collaborative problem-solving whereby plans were agreed to ameliorate threats to quality of life, promote social and physical activity and enhance self-management of chronic disease. The Geriatricians spoke to the relevant
primary care Physicians on a weekly basis and sent a consultation letter detailing the problems, the recommended management and the goals to achieve. Several outcomes were measured at a mean follow-up period of 1.3 years. Relative to the controls, there was a statistical significantly lower frequency of hospitalisation (43% lower amongst the intervention group), and healthcare costs (26% lower) amongst the intervention group. There was no effect on any of the other outcomes which included mortality and outpatient attendance. The design of the study however meant that the results could have been affected by confounders and these results would need to be validated using a prospective and if possible, randomised control trial.

Another USA-based study evaluated a Primary Care model for the elderly using enhanced collaboration between health care providers (Physicians and Nurses), and patients as the intervention over two years (Schraeder C et al 2001). It involved randomisation of eight Primary Care practices of which four were rural and the other four urban. The intervention was the addition of a Nurse and a Care Assistant to the primary care practice treatment arm with the aim of setting up assessments of patient/family, routine telephone monitoring to identify changes and adherence to plans. The health status of patients in the treatment practices was poorer than the control practice patients at base-line but during the second year, the mortality rate was statistically significantly lower in the treatment patient population. There was no difference in any other outcomes such as hospitalisation or hospital length of stay.

Another USA-based study looked at the incorporation of Community-based Primary care Physicians in an existing model of care designed as an alternative to Nursing Home admission of frail older people in the community (Rearden GL et al 2008). This model (PACE, Program of All-inclusive Care for the Elderly), maintains patients in the community who would otherwise be eligible for nursing home admission by providing medical care, home care and social support. The medical care has traditionally been provided by a Staff Physician who is employed by the PACE programme rather than by Primary Care Physicians. This study evaluated the additional input of community based primary care physicians by survey of the medical director, 2 community-based primary care physicians and 6 non-physicians staff members at one of the 3 PACE programmes which had incorporated this addition. Although based on only one programme and on the basis of a few responders, the addition of Community based physicians surveyed generally positively. As a consequence, the PACE programme would be extended to a greater proportion of the population.

The impact of enhancing the knowledge of Primary Care Doctors in Geriatrics has been evaluated in Hong Kong (Lam TP et al 2011). This involved primary care doctors undertaking a year-long post-graduate training course in community geriatrics. However, the evaluation was based on the results of a questionnaire completed by a relatively small number (n = 98; response rate = 52%). The responses before and after the course, demonstrated an increased degree of confidence in diagnosing and managing common geriatric problems and in deciding which speciality to refer to. They also indicated more involvement in geriatric care and reported better communication with elderly patients. Although the average number of older people seen per day by the primary care doctors increased after the course, visits to nursing homes had not and there remained expressed difficulties in conducting nursing home visits.

**Patient’s Home**

Many of the interventions for which there is evidence for their effectiveness in terms of survival, hospitalisation rates and lengths of stay, have focussed on improving functional or physical states rather than mental state of older people e.g. discharge planning (Shepperd S et al 2010). This had been highlighted previously in the reviews of Cole (Cole MG 1998; and
The first of these is a narrative systematic review and assessed the impact of home screening services on the mental state of men and women aged 65 years and over who lived at home (Cole MG 1998). On the basis of 7 RCTs involving 3,532 participants there was no evidence of any effect of screening on their mental state. The screening methods varied between trials, with a home visit being the most common mode of delivery (in six out of the seven studies), and 1 which was undertaken by a postal questionnaire. The screening frequency varied from 1 to 4 times a year with outcomes measured 12 to 36 months after the initial assessment. Screening assessed the physical, mental, functional or social status and on this basis, referral or advice was made. The assessors included physicians, nurses, social workers or volunteers.

The same author reviewed the impact of post-discharge services provided to older people at home on the mental state of older people who had been discharged from hospital or in one trial from a rehabilitation unit (Cole MG 2001). Eleven studies, all controlled trials, were included (3,814 participants) with services lasting between 2 weeks to 12 months. Mental state and other outcomes were measured at post-discharge times varying from 4 weeks to 12 months. Most of the studies were in the USA and UK. The types of post-discharge service varied and included multi-disciplinary team follow-up, regular visits from a Nurse, Home Care Aide or a Volunteer. Again the conclusion was that there was little evidence of any impact of these services on the mental state of elderly patients.

A systematic review with meta-analysis of 21 RCTs (14,957 participants) assessed the effects of multidimensional preventative home visit programmes for community dwelling older people aged 70 years and over on functional status, mortality and nursing home admission (Huss A et al 2008). Studies involving post-discharge programmes or care-management programmes or those that had a specific focus (e.g. rehabilitation) were not included. All studies had designs with follow-up that included regular contact with intervention participants (i.e., multiple home visits, or home visits with regular telephone follow-up). Interventions were delivered by a range of different people including Geriatricians, Community Nurses, Health Visitors, Geriatric Nurses, and Volunteers. There was a statistically significant beneficial effect on functional status when the programme had included clinical examination. Nursing Home admission was reduced overall but the difference was not statistically significant. Stratification by age group revealed a beneficial effect on mortality with younger groups.

The benefit of a preventative strategy was also highlighted in a recent article reviewing the clinical spectrum of frailty in older adults (Ko FC-Y, 2011). This review based on the health care system in the USA, recommended screening for frailty in the community dwelling older person. It highlighted the lack of knowledge amongst non-geriatric physicians in the recognition of the signs and symptoms of frailty syndrome which if diagnosed early would allow the implementation of exercise therapy and geriatric-focused interdisciplinary management. The recommendation was for the use of assessment instruments that can be used by non-Geriatric Physicians.

A randomised control trial undertaken in the Netherlands to assess the effectiveness and cost-effectiveness of a problem-based community intervention model for frail elderly people has reported benefits in both costs of health services and in the proportion of successful treatments as measured by prevention of functional decline accompanied by improved well-being (Melis RJ et al 2008). Savings in costs were reported to be from less hospitalisation and institutionalisation rather than from less home care, meals on wheels and adult day care. The calculated numbers to treat to obtain a benefit was 4.7 and the increase in the proportion of successful outcome was 22%. The intervention (Dutch Geriatric Intervention Programme, DGIP) included older (70 years or over), frail people living in the community who were referred by a Primary Care Physician due to a recently presented problem relating to cognition (but not moderate or severe dementia), mood, behaviour, mobility or
nutrition. Participants were living either at home or in a home for the aged. Unfortunately, there was no indication of the proportion by setting of the study population. The study population excluded people who were receiving other forms of healthcare in the community. The comparison was with usual care which was not well defined and there were 151 participants. The intervention was delivered as an initial assessment within two weeks of referral by a Geriatric Specialist Nurse using a specific assessment tool. Thereafter there would be a maximum of 6 follow-up visits within 3 months. The Nurse, Geriatrician and Primary Care Physician had frequent consultations on individual patients. There were no restrictions imposed on the care patients received in the control group. However, the size of the study and the lack of detail concerning the actual community setting, limit interpretation on its generalisability.

**Summary of effectiveness of various community settings**

- **Medical Day Hospitals** appear not to confer any benefits over other forms of comprehensive elderly care but when compared to no treatment, are associated with better patient outcomes such as activities of daily living and decreased use of hospital beds.

- There is a paucity of studies evaluating the effectiveness of direct input of specialist Geriatric services to **Care Homes**. The Royal College of Physicians have highlighted lack of engagement of Geriatricians with care homes as an important deficiency in the care of older people. The following summarises the review findings in relation to this and other aspects of care homes:
  - On the basis of one UK study, assessment of people at risk of admission to nursing homes by a Geriatrician reduced deterioration of functions, less stress for carers, lower service contacts and costs.
  - Medication review of patients in a nursing home in Hawaii by geriatrician/geriatric medicine fellow, reduced poly-pharmacy, ineffective medications, potential drug-interactions
  - An evaluation of a 12 month postgraduate course for Primary Care Physicians on Community Geriatric care (Hong Kong), improved confidence in diagnosis and referral but had no effect on nursing home visiting
  - In the USA, a model involving the remote management of an advanced Practice Nurse and a Physician’s Assistant by a specialist Physician in old age to regularly assess residents and train other Nursing Home staff positively evaluated for lower hospitalisations and improved quality of care.
  - Evaluation of Nursing models in nursing homes in the Netherlands show improvements in particular aspects of care. A national standard assessment instrument is considered desirable with RAI as an example. The implementation of such nursing models in care homes in the UK is unknown.

- **The optimal role of Geriatricians in Primary care** is considered unknown and most of the evaluations of various primary care models with specific geriatric service input were found to be based in the USA. One retrospective cohort study demonstrated statistically improved outcomes including lower hospitalisations and costs for patients assessed by and whose care was recommended, by a Geriatrician. Other various models in the USA also evaluated positively, one is the PACE programme which is an alternative form of care for some older people to residential care. A variation of this which involved the input of primary care physicians, evaluated well, demonstrating the possibility of extending the PACE programme to a wider population.

- **Training of Primary Care Doctors** (Hong Kong) in community geriatrics (1 year course) evaluated well for most aspects including diagnosing and referring patients. It was not positive for nursing home visits which were considered difficult prior to the course and on which there was no impact seen after the course.
There was no evidence from systematic reviews to support the benefit of home-screening programmes on the mental well-being of older people.

There was evidence from systematic review with meta-analysis on the effectiveness of multi-dimensional preventative home services (out with discharge planning/rehabilitation/case management specific services) in improving functional status when a clinical examination was included.

A review of the health care system in the USA highlighted the potential of screening for frailty in the community but the lack of knowledge of non-geriatric specialist physician of the signs and symptoms related to the frailty syndrome needed to be addressed.

There is some evidence from the Netherlands that a problem-based community intervention model (DGIP) reduces functional decline and improves well-being. The programme depends on primary care physicians to refer patients who have recently presented with a problem. The intervention involves initial assessment by a specialist nurse using a standardised instrument with on-going consultation with a geriatrician and primary care physician.

2. Models by specific type of care or management

(i) For specific conditions

**Chronic Heart Failure (CHF)**

A recent editorial set out a cogent argument for more Geriatrician input into the management of older patients admitted acutely for chronic heart failure (CHF) in the UK, (Baxter J and McDonagh T 2012). The case for this was based on the most recent national (England & Wales) heart failure audit in which 42% of patients were reported to having been managed by the Cardiology wards and the remainder by other specialties. The patients managed by the specialist service were younger and their outcomes (mortality) better than the older patients managed by non-specialist service. Similarly, those followed up by attendance in a CHF clinic had better annual mortality rates. This situation apparently accords with the recognition by Geriatricians that older people admitted acutely with CHF are less likely to receive appropriate investigations and management by specialists. Furthermore, the authors contend, the outcomes of these patients would be improved if Geriatric specialist coordination of care was implemented in the context that older patients are more likely to have contra-indications or be intolerant of the standard CHF medication and to have co-morbidities that may take precedent over the CHF management. The authors argue that this situation is similar to the one that existed for patients with stroke prior to the implementation of stroke units and therefore indicates a need for geriatricians to lead the way again in service improvement for patients with CHF.

**Chronic Kidney Disease (CKD)**

This is another example where the disease-oriented model of care is less likely to be appropriate in older people due to complex co-morbid conditions and geriatric syndromes. However, CKD is more prevalent in older adults due to decreasing glomerular filtration rates on ageing and in NHS Highland, future need for Renal Replacement Therapy (RRT) has been assessed ([http://intranet.nhsh.scot.nhs.uk/Org/CorpServ/PublicHealth/Epidemiology-HealthSciences/Documents/Publications%20+Resources/Renal%20replacement%20therapy%20stat%20update%20(March%202012).pdf](http://intranet.nhsh.scot.nhs.uk/Org/CorpServ/PublicHealth/Epidemiology-HealthSciences/Documents/Publications%20%20Resources/Renal%20replacement%20therapy%20stat%20update%20(March%202012).pdf)).

A recent review promotes an individualised patient-centred approach as this should prioritise patients preferences and encompasses the notion that signs and symptoms often do not reflect a single unifying disease process in older patients (Bowling C & O’Hare AM 2012). The review notes that in the absence of evidence from clinical trials on the effectiveness of
usual treatment in older people (most trials limit age to 70 years), the input of a Geriatrician in the management of such patients is thus appropriate and would help to attain a balance between managing geriatric syndromes and managing the disease process.

Older people also increasingly comprise the population with end-stage renal disease. In the USA, a 50% increase in the rate of those aged 80 years and over receiving dialysis over the last decade has been reported, (Tamura MK 2009). The author reviewed several studies in which 12 month survival rates after initial dialysis were reported. However, whilst overall the survival at 12 months was 54%, a substantial minority (20%) die within the first 3 months. Compared with younger dialysed patients, the quality of life in relation to physical function but not in terms of mental well-being is lower in older dialysed patients. It is suggested that for some patients alternative forms of therapy to dialysis may be appropriate. There is some evidence that quality improvement initiatives in geriatric ESRD care have been successful.

One of these initiatives is a geriatric haemodialysis rehabilitation care programme in Toronto, Canada (Li M et al 2007). The aims of the programme are to: (1) increase the number of elderly dialysis patients who remained independent in the community after acute or sub-acute functional decline, and (2) limit the use of acute-care facilities for these patients during rehabilitation therapy. The programme has been evaluated after the first 3 years of its operation during which 164 patients had been admitted to it. The criteria for admission included all haemodialysis patients over the age of 65 years who at the time of transfer would be considered unable to manage their own personal care if returned to their own usual home setting. The average age was 74.5 years, with a mean period of 1.4 years on previous dialysis. The majority of these patients had been accepted to the programme from hospital after undergoing an acute episode of care. The mean length of stay in the programme was 48.5 days after which 68% were discharged home, 21% to assisted living or nursing home and 11% to acute or palliative care. The elements of the programme included daily dialysis, integrated multidisciplinary care from rehabilitation, geriatric, and nephrology disciplines.

**Mental Health**

Older people with severe and persistent mental illness often have substantial functional difficulties, medical co-morbidity and cognitive impairment. Cardiovascular disease is particularly disproportionately prevalent in this population possibly due to life-style risk factors as a consequence of the impact of their mental state which can fluctuate between extremes. Also the affect of medication may also predispose to the affects of diabetes or CHD through the increased risks of non-adherence to medication and/or the avoidance of drug interaction. One model of care for older people with bipolar disorder was specifically developed in the USA and is being evaluated within an RCT (Kilbourne AM et al 2008). Criteria for admission to the programme were a diagnosis of Bipolar disorder with at least one of the following risk factors for cardiovascular Disease: Hypertension, Diabetes, hyperlipidaemia or Obesity. In total 58 patients were randomised to receive either usual care or the BCM programme (Bipolar Disorder Care Model). The average age of patients was 55 years and the programme consisted of 3 elements: Self-management; Care management; Guidelines. Self-management consisted of group psycho-educational sessions in coping strategies for symptoms, life-style and adherence. Care management was by a nurse care manager who provided direct patient care and co-ordinated care by general medical, geriatric and mental health providers. The Guidelines element was a 1 hour series of continuing medical education sessions addressing CVD risk in older patients with Bipolar disorder to which general medical and mental health providers attended. The usual care arm also received the Guidelines element. The preliminary findings only were presented which provided base-line measurements of outcomes such as the quality of life measures for physical and mental health (SF-12) and the symptom scores for Bipolar disorder.
Another model set in the UK for the management of depression in older people has been evaluated in an RCT (Chew-Graham CA et al 2007). Depression is the most common mental disorder in people aged over 65 years and late-life depression is associated with chronic illness and disability. It affects approximately 1 in 10 of older people but this includes mainly minor depression as opposed to major depression, the prevalence of which is less than 1 in 50, (Beekman AT et al 1999). The model (collaborative care model) was based in a primary care Trust in Manchester. The study randomised 105 patients aged 60 years and over (mean age 75.5 years) who had scored 5 or more on the Geriatric Depression Scale to the model or to usual care. Just over a half (53%) were living independently in their own homes and only 2 were in residential care. The intervention group received care from a Community Psychiatric Nurse (CPN), who provided a self-help programme in close liaison with old-age psychiatry and primary care professionals. The intervention lasted 12 weeks with the CPN reviewing the patient every 4 weeks. The CPN contacted the GP in person when necessary e.g. for any change in medication, and the GP received written reports of each assessment the CPN made which occurred at baseline and at 4, 8 and 12 weeks. The intervention itself included educational and self-help sessions consisting of 6 face to face sessions in the patient’s home and 5 sessions delivered over the phone. All GP Practices within the PCT were supplied with guidelines consisting of diagnostic criteria, appropriate investigations and primary care management of depression in older people. The main outcome measured was the proportion of patients with 5 or more symptoms on the SCID depression scale as at 16 weeks follow-up. The odds ratio for being depressed in the intervention group at 16 weeks compared with those in the usual treatment group was 0.38 (0.15-0.97, 95% CIs) which was statistically significant.

Only one review concerned with nursing homes was identified in which 8 RCT studies were included. The participants had somatic illness or dementia combined with psychiatric disorders or severe behavioural problems (Collet J et al 2010). On average the patients had 3 co-morbid conditions of which diabetes and cardiovascular were the most common. The interventions were comprehensive and used an integrated multidisciplinary approach provided by a range of professionals from medical, Psychiatric and physical therapists. The outcomes of reduction in agitation and physical aggression were found in seven of the 8 studies. However, there was a chance of bias and there was no statistical assessment of the outcomes.

An earlier health technology assessment supported this finding in so far as concluding that comprehensive approaches to mental illness in the elderly were more likely to be beneficial (Ahuriri DA et al 2004). This assessment noted that Geriatric Psychiatric services are effective in community settings. The intervention effect sizes were larger when there was multidisciplinary team assessment and treatment of depression and comprehensive management of dementia.

**Hip Fracture**

It has already been noted that the co-management of patients with hip fracture between the Geriatrician and the Orthopaedic surgeon is associated with better outcomes. (Chong CP et al 2009). A review written by some American authors described the development of such models and traced the origin to London in the 1950s (Freidman SM et al 2008). Other countries have since reported on its effectiveness (Australia, Italy) but it is not certain how widespread this model of co-management is in the UK. The same authors suggest that it is a transferrable model of care which could be adopted by the USA. However also noted previously, a pre-post design evaluation of a different model based in the USA in which the Geriatrician undertakes the primary care of the patient, seemed to be effective, (Miura LN et al 2009)
In-hospital rehabilitation programmes for older people with hip fracture has also been noted previously as being effective (Bachmann S et al 2010) when the rehabilitation team includes Geriatrician, Orthopaedic Surgeon and other multidisciplinary members of a team. Outcomes included improving short-term functioning and reduction in the rate of nursing home admissions.

**Summary of specific conditions**

- On the basis of national audit data, the situation for older people with CHF in the NHS (E & W) has been likened to the situation prior to stroke units. Thus it is speculated that Geriatric-specific input would improve these patients’ outcomes.
- Disease-oriented model of care is considered to be inadequate in meeting the needs of older people with chronic kidney disease and that improvement could be achieved with Geriatric input which would address the balance between managing geriatric syndromes and managing the disease process. There is some evidence that those with end-stage renal disease have poorer physical outcomes than younger dialysed patients. There is some evidence from Canada that a geriatric haemodialysis rehabilitation care programme improves patient outcomes and functioning and involves daily dialysis.
- Older people with specific mental health disorders have disproportionate prevalence of cardiovascular disease. A programme for Bipolar disorder in older people in the USA has been described which addresses the risks for cardiovascular disease in these patients. As yet there are only baseline evaluation data. A collaborative care model for older people with depression, based in a primary care trust in the UK demonstrated significantly better outcomes in terms of the number with depression at 16 weeks follow-up as evaluated in an RCT. There is some evidence that similar interventions for nursing homes residents reduce the degree of agitation and physical aggression they experience.
- There is good evidence that the outcome of people with hip fracture whose care is co-managed between Geriatrician and Orthopaedic Surgeon, have better outcomes. There is evidence from the USA that the whole of the hospital management of these patients primarily managed by the Geriatrician also have better outcomes.

(ii) Mode of delivery

Telecommunication linkage of acute hospitals to other peripheral institutions may be beneficial in making geriatricians expertise more accessible and available in the care of frail elderly people. A recent review of telemedicine and the older person, (Yu TKK 2010) in different areas of geriatric service noted some findings based on settings and specific conditions. Some of these are noted below:

- For care homes, a TeleGeriatric system using web browsing technology and broadband communication led to better triage leading to a reduction in unnecessary hospital admissions. This was based in Singapore and used web-browsing and broadband technology. However these were only preliminary results without statistical analysis. Patients demonstrated compliance to and preference for tele-consultation. (Pallawala PM and Lun KC 2001)

- For domiciliary management of congestive heart disease, COPD, post-cardiac surgery, renal disease and diabetes, most of the studies demonstrated equal if not moderately better results using telehealth technologies, compared to usual care. Amongst the cited studies, was a systematic review with meta-analysis of 29 primary studies, (DelliFraine JL and Dansky KH 2008). Although with limitations in respect of
publication bias and generalisability due to the variety of different technologies used in the studies, the authors undertook sub-analysis by age group and by specific disease condition. Overall the clinical outcomes (summarised as an effect size from various different measurements) were statistically significantly improved compared to usual care with the effect being stronger in the under 65 year age group and weaker in the 65 years and older age group but still remaining statistically significantly better in both groups. The conditions associated with better outcomes were Psychiatric and heart disease but not diabetes. The types of tele-health used in the studies varied including telephone, data monitor, internet, and video monitor as did the types of healthcare professionals involved. This latter observation highlights the importance of interpreting the results of such studies with caution. This particularly applies to the situation in diabetes where some primary studies not included in the systematic review, have reported positive results. These were based on very specific types of technology and included some educational interventions.

- There is some evidence that in specific situations, telecommunication can be used reliably for the assessment of cognitive function. The use of video-conferencing in the scoring of the Mini-Mental State Examination (MMSE) has been shown reliable in various situations, (Shulman B et al 2006).

Rehabilitation by telemedicine technology has been trialled in one location in Australia for older people (Peel NM et al 2011). The system, eHAB™, used an in-home videoconferencing system for patients living at home but within a specific transition programme i.e. after discharge from hospital. The patients in the programme are elderly and frail and at risk of hospital re-admission. They also need to have adequate hearing and vision and be expected to be in the programme for at least two weeks. Over 8 months only, 23% of a total of 44 patients were deemed suitable for tele-rehabilitation mainly due to the majority not having adequate hearing and vision, cognitive impairment, client/carer anxiety, lack of space in the home. Only 3 patients proceeded with the eHAB programme. Staff found the programme challenging on the basis of the complexity of the cases. There was no indication of the specific staff groups involved with delivery of the system other that of the TCP team.

Another study based in Canada (Tousignant M et al 2006) reported the results of 4 case studies. These patients had similar characteristics to the Australian study in that they were discharged to their own home after an acute hospital episode. However, the intervention was restricted to physiotherapy. Staff satisfaction measures and those of four clinical outcomes for the patients (functional autonomy, balance, locomotor performance and lower body strength) were all positive.

A systematic review of tele-rehabilitation looked at 28 studies and concluded that in general, clinical outcomes were improved and satisfaction of patients and therapists were high (Kairy D et al 2009). However, the included studies covered the full age-range and involved various specific conditions for which rehabilitation was required.

In conclusion, there is insufficient evidence for the effectiveness of telehealth technologies in domiciliary and in care home settings in the care of older people.

**Summary of mode of delivery**

- Models of care using a variety of telehealth technology to improve the accessibility of the expertise of the Geriatrician have been described in the areas of:
  - Triage in care homes using web-browsing and broadband technology was found to avoid some hospital admissions in Singapore based on preliminary findings.
- Domiciliary management of some specific conditions (COPD, post cardiac surgery, diabetes, renal disease) demonstrates equal if not better outcomes although this was less so for those aged 65 & over and for those with diabetes. Cautious interpretation of the findings is needed due to the larger range in types of technology used.
- Assessment of cognitive function; the use of MMSE using video-conferencing is reliable in certain situations.
  - Rehabilitation using tele-health technology has been described for many conditions and in general, outcomes were equal to or better. There is some evidence that patient satisfaction is high but that of therapists may be variable.

### 3. Models by type of location

Type as defined by rural and urban setting can apply differently to both the location of the provider and to the place where the patient or service user resides. For example, a hospital in a rural setting, (in NHS Highland this would apply to the rural general hospitals and many of the community hospitals), or other community-based rural service may need to access specialist geriatric resource from urban-based hospitals or other urban-based health care organisations. In Argyll and Bute, this resource would reside in the hospitals of Greater Glasgow and Clyde in addition to the Community-based service of one WTE Geriatrician. In Highland HSCP (Highland Council area), Raigmore Hospital would be an example of an urban available resource, whilst the Rural General Hospitals of Belford (Fort William) and Caithness General require to access specialist resource from Raigmore Hospital and from the one WTE community-based Geriatrician. On the other hand, community-based residents will look for specialist service from any of these hospitals and from community-based services appropriate to older people. Accessibility to them will depend on where older people live. As is the case in many other developed countries e.g. Canada, there is a larger proportion of older people making up the populations in rural and remote areas than in urban areas. This will have an impact on the availability of carers as well as presenting an additional challenge for those that need to access services from distant remote areas.

The following sections describe what issues may be related to the type of location of the service user (i) and that of the service (ii).

#### (i) Meeting the needs of Urban, rural and remote dwelling older people

There is evidence for the effectiveness of preventative home-visits as noted earlier in the in the “patients home” section (Huss A et al 2008; Melis RJ et al 2008). However, for remote residing communities, this provision would challenge the availability of resource. An evaluation of a demonstration project based in the USA in which a home-based comprehensive assessment of rural elderly persons (CARE) was delivered, demonstrated some benefits, (Cravens DD et al 2005). It involved a home health agency care team in the patients’ homes consisting of a nurse and a social worker. A Geriatrician provided support from a remote location by interactive teleconference. The latter was based in an urban academic medical centre. Patients were aged 75 years and over and were recruited by family practitioners working within the rural area. The nurse had no advanced degree (i.e. not specialised in Geriatrics) but received training on the delivery of comprehensive geriatric assessment (CGA) by a Geriatrician.

The in-home assessment included medical history, a geriatric review of systems, a physical examination and measurement of activities of daily living (ADL using the Barthel scale and the Lawton instrument), the Mini-mental Status Exam (Folstein), the 15 item Geriatric Depression scale Gait and balance exam (Tinetti), self-rated items from the Medical
Outcomes Study 36 item Short form (SF-36, medication inventory, home safety assessment and the Mini-Nutritional Assessment-Short Form. The nurse, social worker and the Geriatrician conducted weekly meetings to discuss and agree recommendations on the basis of the assessments. Clients and the primary care physicians were sent a report of the findings with identification of a single major concern and no more than 4 or 5 other issues. Follow-up at 3 months was conducted by telephone.

Over a 13 month period, 51 patients had been recruited. During the project, 3 patients died, 1 entered a long-term care facility and 1 patient withdrew from the programme after the initial assessment. The most frequent single issue was deficient immunisation status followed by unsafe homes, sensory defects and depression. Using 4 or more medication items to define poly-pharmacy, a slight majority was found. Follow-up assessment revealed that out of the 56 recommendations made for major problems, 18 (32%) had been implemented. Of the 158 non-major issues, 35% had been implemented. Further evaluation consisted of surveying the primary care physicians, patients and families.

Of those patients who could be surveyed, 91% reported satisfaction with two patients reporting dissatisfaction. This contrasted with the family physicians who were surveyed by fax after each patient assessment. Out of the 48 patient assessments, 56% of them were responded to by the Physician. Whilst there was strong agreement that the process worked well, only 30% considered that the recommendations helped with the patients management and only 37% thought the recommendations were worthwhile. Barriers to implementing the recommendations were given as lack of support system issues (social support, transportation), patient issues (e.g. unwillingness to change) and Physician Practice issues such as lack of patient follow-up, lack of local consultants to help with multiple medical problems.

A literature review concerning Geriatric tele-psychiatry and telemedicine by some Canadian authors highlighted the potential for this technology to extend multidisciplinary expertise to rural areas (Shulman B et al 2006). Studies reported varying results for the reliability of some of the standardised tests but generally were acceptable for the more basic screening instruments (Geriatric depression Scale and the MMSE). The authors concluded that it was not so much the technology or its use as issues, but more the lack of what the optimal models of its use may be and the effectiveness of its application, sustainability and cost-effectiveness.

(ii) **Urban, rural and remote-based location of services**

Extending the expertise of Geriatricians by electronic communication has also been evaluated in the USA as a means of disseminating the Acute Care of Elders (ACE) principles for hospitalised older patients to hospitals without geriatricians (Malone ML et al 2010). This study described and evaluated the use of a patient information tracker system (ACE Tracker) and the input of an off-site Geriatrician (e-Geriatrician) to the care of older patients hospitalised in hospitals without Geriatricians and without an ACE unit or programme. An ACE unit/programme as previously described, (page 3), provides Geriatric specific-care in an acute hospital (usually in an urban location) by the provision of a multidisciplinary team in an adapted physical environment or in a designated unit. Such provision has been associated with better functional outcomes and a greater likelihood of discharge to home. Generally they do not operate in hospitals without Geriatricians and do not include patients who are being cared for in other units such as cardiac. Thus the use of the ACE tracker and e-Geriatrician is to extend the concepts of ACE to other hospitals, particularly community ones. The arrangements to produce a virtual ACE unit in these hospitals used the following:

- The ACE tracker (software programme) extracts specific items of information from the patients single electronic medical record (this includes all the patients healthcare
related activity in relation to this particular healthcare provider in Wisconsin (comprises acute hospitals, pharmacies, home care, hospice, Psychiatric hospital, clinics). The information extracted includes medical history as well as current healthcare uptake, referrals for AHP or social case assessments and medications. The information is pulled out as a daily report for all patients in the hospital aged 65 years and over. This report consists of a spreadsheet, each row being a patient and the columns presenting the information of a set data set and thus providing a checklist.

- Interdisciplinary teams in the hospital consisting of social worker, physical therapist, pharmacist, led usually by a clinical nurse specialist meet 5 days a week for 30 minutes and use the ACE tracker reports. This enabled identification of risks for each patient which directed patient management plans.
- A Geriatrician “attends” twice weekly interdisciplinary team meetings as an e-Geriatrician via teleconferencing and will discuss high risk patients to develop a plan of care in response to geriatric problems. The e-Geriatrician can access the ACE tracker report checklist for all the patients to be covered in the meetings. The total time spent with the e-Geriatrician on a conference call is usually 30 to 45 minutes.
- The outcomes of the ACE meetings are recommendations made for patients. These will be presented to the attending Physician the next time the Physician sees the patient. Sometimes if more urgent or complex, the attending Physician is called after a meeting to discuss a specific request or suggestion.
- The ACE tracker was evaluated by comparing a nursing observer documentation of the information for each of 93 patients with that recorded via the ACE tracker checklist. The predictive negative and positive values of the tracker in reference to the nursing assessment were high varying from 84.8% to 100% across the measures presented in the article. The estimation of particular risks for the patients also agreed between the independent (nurse observer) and the ACE tracker.
- The evaluation of the e-Geriatrician was based on the measurement of some measures before and after the intervention. The proportion of patients with urinary catheters decreased and the proportion of those receiving consultations for physical therapy increased significantly. Other changes such as the percentage on high-risk medication and with restraints were not statistically different.

**Summary of evidence by type of location**

- A home-assessment model operating in the USA for rural dwelling older people has been described. This uses the input of a Geriatrician remotely (teleconferencing) and the comprehensive geriatric assessment delivered by a nurse trained by Geriatricians. The model made recommendations of care to the primary care physician on medication and future care. The model was variously accepted by the primary care physicians, with a minority believing that the recommendations were worthwhile. This should be taken in the context that the Physicians highlighted many barriers to the implementation of the recommendations. A literature review concluded that most of the basic standard tests such as the MMSE are reliable when used in the remote tele-health context. What are the best models of its use and the effectiveness of its application remain unknown.
- The USA has developed an e-Geriatrician model in which expertise of Geriatricians based in urban centres can be extended to rural and other hospitals that do not have any other access to Geriatricians. It uses an ACE-tracker software facility which provides a standardised report checklist to be available to all health care professionals involved in the care of the patient. Evaluation based on a before and after design, reported decreased urinary catheterisations and increased management by physical therapists.
Overall Summary

1. Models by Setting

(i) Within Hospital

Of the two contrasting models existing in the UK and the USA, the one adopted in the US (i.e. the Hospitalist) is theoretically more likely to meet the NICE quality standards for the care of older people in hospital. This is because the NICE standards require application of generalist medical skills which the Hospitalist resource available in USA hospitals (a physician specialising in hospital medicine) can provide. The NHS model has limited provision in the form of the Acute Medical Physician which could only increase at the expense of the sub-speciality workforce. The NICE standards of care are also consistent with the evidence that geriatric-specific care of older people in the acute phase of illness and in rehabilitation is associated with better clinical outcomes. The evidence is strongest for models that use specific physical environments such as Acute Geriatric Units or wards. An effective element of these models of care is comprehensive geriatric assessment. Most of the evidence has been obtained from US-based studies and there is a lack of published evaluation of the UKs most common model of acute care, that being the acute medical admissions unit (AMU).

There was evidence for the effectiveness of co-management of older people by Geriatricians and Specialists in other disciplines such as Orthopaedics in the case of hip fracture or avoidance of delirium in others as opposed to the typical model currently existing in UK hospitals of within hospital referral for individual patients. In contrast, there is conflicting evidence for the effectiveness of a visiting Geriatric specialist team. There is strong evidence to support the effectiveness of Geriatric-specific rehabilitation programmes, particularly those that are orthopaedic-related. It was not possible to assess which models were effective for patient and carers satisfaction due to the lack of such measures in the published studies.

(ii) Across the hospital-community interface

Discharge planning to home scheme (early discharge) and Nurse-led units has both evaluated positively in terms of older patient outcomes but there has been no specific assessment of the medical geriatrician input. There is some evidence that models promoting self-management and greater understanding of medication may result in better patient and carer satisfaction (Geri-FTT model in the US) and in the number of bed-days due to readmissions (Germany). In contrast there is no evidence to support Day Hospital as an effective setting for transitional care.

(iii) In the community

There was no evidence of any additional benefits of medical day hospitals over and above other forms of comprehensive care.

In terms of nursing homes there was supporting evidence for the effectiveness of geriatric specialist involvement in the areas of medication review and assessment before nursing home placement of people at risk of admission. An educational programme for Primary care Physicians in Hong Kong whilst positively evaluated in other areas of improved Geriatric care knowledge and confidence, failed to improve their involvement in Care homes. The
RCP highlights the lack of engagement of Geriatricians with care homes in the UK. In contrast, there was support for the effectiveness of geriatrician-led nursing models of which the RAI is the most well known in the Netherlands, but it is unknown the degree to which such models are implemented in the UK. This intelligence may potentially be useful and could relatively be easily gathered.

The optimal role of Geriatricians or geriatric-specific resource in Primary care is considered unknown and most of the evaluations of primary care models with specific geriatric service input were found to be based in the USA. These models varied in terms of structure and process but the results of the various outcomes (hospitalisation, survival) were generally favourable. One programme (PACE) has been provisionally evaluated with the input from Primary care Physicians rather than hospital physicians and provides an alternative model of care to care homes.

Multi-disciplinary preventative home services out with discharge planning or rehabilitation or specific case management programmes have evaluated positively in terms of patient functional status when involving clinical examination. There is no evidence from systematic reviews of home-screening services improving mental well-being. However, evidence from a single RCT based in the Netherlands suggests that home-screening for frailty of people recently presenting to Primary care by Geriatrics specialist assessment in a person’s home prevents functional decline and increases well-being.

2. Models by Specific type of care or management

(i) For specific conditions

For specific conditions, evidence appears to be in favour of a geriatric-specific and multidisciplinary model of care to provide the optimum clinical outcome for older patients with co-morbid conditions. Comparison with stroke units which have been evaluated to provide improved outcomes for patients, suggests that the management of other conditions, such as Chronic Heart Failure and chronic kidney disease, would likewise improve patient outcomes when the care has involved systematic Geriatrician and multidisciplinary care. In the specific case of hip fracture, there is strong evidence that co-management between Geriatrician and Orthopaedic Surgeon is more effective but the degree to which this occurs in the UK is unknown.

(ii) Mode of delivery

There is evidence of the effectiveness of some telehealth technology models in improving the accessibility of Geriatrician expertise. One of these is the use of web-browsing with broadband technology in the triage of care home patients to improve the appropriateness of hospital admissions. Another example was in cognitive assessment using the MMSE via video-conferencing. There was also some evidence for rehabilitation where for a range of conditions, the outcomes were at least equal to usual care. The above findings add to the evidence for telehealth in the management of long-term conditions which was previously reviewed as being effective but for which the evidence for its cost-effectiveness was conflicting (Ref: http://intranet.nhsh.scot.nhs.uk/Org/CorpServ/PublicHealth/Epidemiology-HealthSciences/Pages/PublicationsResources.aspx)

3. Models by Type of location

(i) Meeting the needs of urban. Rural and remote dwelling older people
A home-assessment model operating in the USA for rural dwelling older people uses the remote input of a Geriatrician via tele-conferencing. This is in combination with comprehensive geriatric assessment delivered by a nurse trained by Geriatricians. The model made recommendations of care to the primary care physician on medication and future care. The model was variously accepted by the primary care physicians, with a minority believing that the recommendations were worthwhile. This should be taken in the context that the Physicians highlighted many barriers to the implementation of the recommendations. A literature review concluded that most of the basic standard tests such as the MMSE are reliable when used in the remote telehealth context. However, there is insufficient evidence or study to recommend what models of telehealth technology are effective.

(ii) Urban, rural and remote-based location of services

The USA has developed an e-Geriatrician model in which expertise of Geriatricians based in urban centres can be extended to rural and other hospitals that do not have any other access to Geriatricians. It uses an ACE-tracker software facility which provides a standardised report checklist to be available to all health care professionals involved in the care of the patient. Evaluation based on a before and after design, reported decreased urinary catheterisations and increased management by physical therapists.
# GLOSSARY

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE</td>
<td>Acute Care for Elders</td>
</tr>
<tr>
<td>ADL</td>
<td>Activities of Daily Living</td>
</tr>
<tr>
<td>AMU</td>
<td>Acute Medical Admission Unit</td>
</tr>
<tr>
<td>APN</td>
<td>Advanced Practice Nurse</td>
</tr>
<tr>
<td>ASA</td>
<td>American Society of Anaesthetists</td>
</tr>
<tr>
<td>CGA</td>
<td>Comprehensive Geriatric Assessment</td>
</tr>
<tr>
<td>CHF</td>
<td>Chronic Heart Failure</td>
</tr>
<tr>
<td>CKD</td>
<td>Chronic Kidney Disease</td>
</tr>
<tr>
<td>CRD</td>
<td>Centre for Reviews &amp; Dissemination, NHS National Institute for Health Research includes the databases of DARE, NHS EED, HTA-see below</td>
</tr>
<tr>
<td>CVD</td>
<td>Cerebrovascular Disease</td>
</tr>
<tr>
<td>DARE</td>
<td>Database of Abstracts of Reviews of Effects</td>
</tr>
<tr>
<td>GEMU</td>
<td>Geriatric Evaluation &amp; Management Unit</td>
</tr>
<tr>
<td>Geri-FITT</td>
<td>Geriatric Floating Interdisciplinary Transition team</td>
</tr>
<tr>
<td>GRN</td>
<td>Geriatric resource Nurse</td>
</tr>
<tr>
<td>GSS</td>
<td>Geriatric Surgery Service</td>
</tr>
<tr>
<td>HELP</td>
<td>Hospitalised Elder Life Program</td>
</tr>
<tr>
<td>HSCP</td>
<td>Health and Social Care Partnership</td>
</tr>
<tr>
<td>HTA</td>
<td>Health Technology Assessment</td>
</tr>
<tr>
<td>MMSE</td>
<td>Mini-Mental State Examination</td>
</tr>
<tr>
<td>NHS EED</td>
<td>NHS Economic Evaluation database</td>
</tr>
<tr>
<td>NICHE</td>
<td>Nurses Improving Care for Health-System Elders</td>
</tr>
<tr>
<td>PACE</td>
<td>Program of all-inclusive care for the Elderly</td>
</tr>
<tr>
<td>POPS</td>
<td>Proactive care of Older People undergoing Surgery</td>
</tr>
<tr>
<td>PCT</td>
<td>Primary Care Trust</td>
</tr>
<tr>
<td>POSSUM</td>
<td>Physiological &amp; Operative severity Score for the enumeration of Mortality &amp; Morbidity</td>
</tr>
<tr>
<td>RAI</td>
<td>Resident Assessment Instrument</td>
</tr>
<tr>
<td>RAPS</td>
<td>Resident assessment Protocols</td>
</tr>
<tr>
<td>WTE</td>
<td>Whole Time Equivalent</td>
</tr>
</tbody>
</table>
REFERENCES


APPENDIX 1: Search methodology

Aim: To review the literature on the effectiveness of various models of specialist geriatric care across the range of settings in serving the needs of the older population.

Search Strategy

Table 1 Limited to:

<table>
<thead>
<tr>
<th>Study type:</th>
<th>Priority for Reviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age range:</td>
<td>Adults and the elderly</td>
</tr>
<tr>
<td>Publication date:</td>
<td>1995 - present</td>
</tr>
<tr>
<td>Language:</td>
<td>English language</td>
</tr>
</tbody>
</table>

Table 2 Relevant Outcomes in assessing effectiveness:

<table>
<thead>
<tr>
<th>survival rate</th>
<th>mortality rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>probability of staying in one’s own home</td>
<td>institutionalisation rate</td>
</tr>
<tr>
<td>emergency hospital admissions</td>
<td>any hospital admissions</td>
</tr>
<tr>
<td>hospital length of stay</td>
<td>hospital readmissions</td>
</tr>
<tr>
<td>mental well-being</td>
<td>physical well-being</td>
</tr>
<tr>
<td>independency</td>
<td>satisfaction with care</td>
</tr>
<tr>
<td>cost-effectiveness</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 Sources of evidence:

- Centre for Reviews and Dissemination: DARE, NHS EED, HTA
- The Cochrane Library
- TRIP Database
- OVID databases (all except MIDIRS)
- NICE
- Dr Foster
- Kings Fund

Secondary Strategy

Scrutinise reviews/articles identified from the primary search strategy to identify any further relevant articles/reviews not already located.
# Literature search plan

## Research Topic

Review the literature on the effectiveness of various models of specialist geriatric care

## PICO Model

<table>
<thead>
<tr>
<th>Patient / Population and / or Problem</th>
<th>Intervention / Exposure</th>
<th>Comparison / Control (if applicable)</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geriatrics, older people, Geriatricians, Geriatric care</td>
<td>Models of care</td>
<td>Usual care/no care</td>
<td>From Table 2 list in various settings and by rural/urban status of area residence</td>
</tr>
</tbody>
</table>

### Alternative Words

| Elderly; Older adults; Older people; Consultant Geriatricians; Geriatrics; Gerontology | Care of elderly; geriatric assessment; care of older people; care models; specific geriatric care; collaborative care | Usual care/no care | From Table 2 list in various settings and by rural/urban status of area residence |
As part of the Directorate of Public Health & Health Policy of NHS Highland, the Epidemiology & Health Science team provide specialist skills in the areas of:

Epidemiology, Evaluation, Literature Review, Health Economics and Database design for Public Health functions

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