

Helge Garåsen

The Trondheim Model

Improving the professional communication between the various levels of health care services and implementation of intermediate care at a community hospital could provide better care for older patients

Short and long term effects

Thesis for the degree of doctor medicinae

Trondheim, April 2008

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Trondheimsmodellen
Forbedring av kommunikasjonen mellom ulike tjenestenivå i helsetjenesten og
implementering av intermediær behandling i et sykehjem kan medføre bedre helse- og
omsorgstjenester for eldre pasienter.
Effekter på kort og lang sikt.

Formålene med studie I var å evaluere kvaliteten på den skriftlige kommunikasjonen mellom kommune- og spesialisthelsetjenesten ved innleggelse i og utskrivning fra sykehus og foreta en vurdering av eventuell medisinsk nytte av oppholdet. Pasientutvalget bestod av 100 innleggelsesskriv og epikriser for pasienter på over 75 år fortløpende innlagt ved ortopedisk, lunge- og kardiologisk avdeling ved St. Olavs Hospital fra Trondheim og Malvik kommuner vinteren 2002. To ekspertpanel ble sammensatt med en erfaren spesialist i allmennmedisin, en sykepleier fra kommunen med erfaring fra omsorgstjenester og en sykehusspesialist i hvert panel.

Konklusjonene i studie I var at innleggeselskrivene manglet så mye informasjon at i mange tilfeller kunne dette representere en helseisiko for pasientene. Det var også dårlig samsvar mellom på første- og andrelinjenivå om hva som ble forstått som god kvalitet på innleggeselskriv og epikriser. Utskrivingsbrevene manglet ofte informasjon om hva som skulle følges opp og av hvem. Det var heller ikke enighet om hvilke pasienter som hadde god nytte av sykehusoppholdet.

Formålene med studie II var å sammenlikne bruk av helse- og omsorgstjenester, kostnader og død i løpet av seks og 12 måneders oppfølging av pasienter sluttbehandlet i en intermediæravdeling i sykehjem med tradisjonell behandling i sykehus. 142 pasienter over 60 år innlagt St. Olavs Hospital for akutt sykdom eller forverring av kronisk sykdom ble randomisert til enten slutt- og etterbehandlet på en intermediæravdeling i et sykehjem eller på sykehuset. Intervensjonsgruppen, 72 pasienter, ble randomisert til fortsatt behandling på sykehuset, mens 70 pasienter ble randomisert til sluttbehandling på sykehjemmet.

Konklusjonene i studie II var at sluttbehandling på intermediært nivå i et sykehjem medførte færre reinnleggelser, at flere pasienter klarte seg selv uten kommunale omsorgstjenester og hadde lavere dødelighet både etter seks og 12 måneders oppfølging. Samtidig var behandlingstilbudet kostnadseffektivt.

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“Helge,

I would like to tell you about my father. He was an old man, but still very active, driving his car all over the county, lived alone in his fourth floor flat and was in good physical and mental shape.

On July 2nd, he was hospitalised because of pneumonia. He was diagnosed quickly and was treated with antibiotics. However, the ward he was on was very passive with few or no stimuli, both physically and psychologically. He was kept in bed all day long. After a while he got heart congestion, he seemed to give up on life, and day by day he lost more and more of his strength until he eventually died.

Treatment from the dark ages, if you ask me, to let an old man rapidly become more and more dependent on care by just leaving him in a bed instead of stimulating him physically and mentally. Maybe there were medical reasons for his death. However, I think your life is put at risk when you are left in bed like that when you are an elderly person.

Rune”

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Summary

Study I

Background

Optimal care of patients is dependent on good professional interaction between general practitioners and general hospital doctors, and this collaboration is mainly based upon the quality of the written communication. The main objectives of study I were to evaluate the quality of the written communication between physicians, the description of follow-up responsibility and to estimate the number of patients that could have been treated at primary level instead of in a general hospital.

Methods

The sample of study I comprised referral and discharge letters for 100 patients above 75 years of age hospitalised at the orthopaedic, pulmonary and cardiological departments at the city general hospital in Trondheim. The assessments were done using a Delphi survey with two expert panels each with one general hospital specialist, one general practitioner and one public health nurse using a standardised evaluation protocol with a visual analogue scale (VAS) from one to eight. The panels assessed the quality of the description of medical history, signs, medication, ADL, network, need for care and the level of benefit gained from general hospital care.

Results

In study I information in referral letters on medical history, signs and medications were assessed to be of high quality in 39 %, in 56 % and in 39 %, respectively. The corresponding information assessed to be of high quality in discharge letters were for medical history 92 %, signs 55 % and medications 82 %. Only half of the discharge letters had satisfactory information on ADL. Some two-thirds of the patients were assessed to have had large health benefits from the general hospital stay in question. One of six patients could have been treated without a general hospital admission. The specialists assessed that 77 % of the patients had had a large benefit from the general hospital admission; however the general practitioners assessment was only 59 %. One of four of the discharge letters did not define who was responsible for follow-up care.

Conclusions Study I

Both referral and discharge letters lack vital medical information, and referral letters to such an extent that it might represent a health hazard for the patients. Health professionals at

primary and secondary level do not agree as to the definition of good quality as far as referral and discharge letters are concerned. Furthermore they do not agree as to the benefits of admission to a general hospital.

Study II

Background

Demographic changes combined with increasing pressure on general hospital beds and other health services by the elderly make allocation of resources to the most efficient care level a vital issue. The aim of study II was to study the efficacy of intermediate care at a community hospital compared to standard prolonged care at a general hospital over a period, with six and 12 months follow-up.

Methods

In a randomised controlled trial, study II, of 142 patients, aged 60 or more admitted to a general hospital due to acute illness or exacerbation of a chronic disease, 72 (intervention group) were randomised to intermediate care at a community hospital and 70 (general hospital group) to prolonged general hospital care. The results are based on intention-to-treat analyses and are adjusted for age, gender, ADL and diagnosis.

Results

Readmissions to general hospital

In the intervention group 14 patients (19.4 %) were readmitted compared to 25 patients (35.7 %) in the general hospital group ($p= 0.03$).

Results after six months

After 26 weeks 18 (25.0 %) patients in the intervention group were independent of community care compared to seven (10.0 %) in the general hospital group ($p=0.02$). There was an insignificant reduction in the number of deaths and an insignificant increase in the number of days of inpatient care in the intervention group. The number of patients admitted to long-term nursing homes from the intervention group was insignificantly higher than from the general hospital group.

Mean total health services costs per patient in the intervention group for the first six months were EUR 9829 (95 % CI 7396-12262) compared to EUR 14071 (95 % CI 10717-17424) in the general hospital group. The mean difference in costs was EUR 4242 (95 % CI 152-8331)

($p=0.003$), and mean difference in cost per day at risk per patient was EUR 37 (95 % CI 1-71) ($p=0.003$).

Results after 12 months

Thirty-five patients, 13 (18.1 %) of all patients included in the intervention group and 22 (31.4 %) in the general hospital group, died within 12 months ($p= 0.03$). Patients in the intervention group were observed during a longer period of time than in the general hospital group; 335.7 (95 % CI 312.0-359.4) versus 292.8 (95 % CI 264.1-321.5) days ($p=0.01$). There were statistically no differences in the need for long-term primary level care or in the number of admissions or days spent in general hospital beds.

Average total health services costs per patient per observed day were EUR 76 (95 % CI 56-95) for the intervention group and EUR 100 (95 % CI 80-120) for the general hospital group ($p=0.03$).

Trial registration

ClinicalTrials.gov NCT00235404

Conclusions Study II

Intermediate care in a community hospital significantly decreased the number of readmissions for the same disease to general hospital and a significantly higher number of patients were independent of community care after 26 weeks of follow-up. There was no increase in mortality and number of days in institutions.

Care at intermediate level in a community hospital was cost effective from a health service perspective and contributes to better patient outcome as more patients had better functional status and significantly fewer patients were dead after 12 months follow-up.

Norsk sammendrag (Norwegian summary)

Studie I

Bakgrunn

Formålet med studie I var å evaluere kvaliteten på den skriftlige kommunikasjonen mellom kommune- og spesialisthelsetjenesten ved innleggelse i og utskrivning fra sykehus med et spesielt fokus på hvem som hadde oppfølgingsansvaret. I tillegg skulle det estimeres hvor mange pasienter som eventuelt kunne blitt behandlet utenfor sykehus i stedet for innleggelse i sykehus.

Materiale og metode

I studie 1 bestod pasientutvalget av 100 innleggelsesskriv og epikriser for pasienter på over 75 år fortløpende innlagt ved ortopedisk, lunge- og kardiologisk avdeling ved St. Olavs Hospital fra Trondheim og Malvik kommuner vinteren 2002. Vurderingene ble gjort ved hjelp av en Delfi-teknikk med to forskjellige ekspertpanel bestående en erfaren spesialist i allmenntmedisin, en sykepleier fra kommunen med erfaring fra omsorgstjenester og en sykehusspesialist. Panelene vurderte kvaliteten på beskrivelsen av sykehistorie, aktuelt, funn, medisiner, ADL, sosialt nettverk, behov for omsorgstjenester, og foretok en vurdering av nytte av sykehusopphold og om pasientene kunne ha blitt behandlet i allmennpraksis, på en akuttpoliklinikk eller på et sykehjem.

Resultater

I henvisningsbrevene var sykehistorie, funn og medikamenter svært godt beskrevet i henholdsvis 39 %, 56 % og 39 % av tilfellene. I epikrisene var tilsvarende områder beskrevet svært godt i 92 %, 55 % og 82 % av tilfellene. Bare halvpartene av epikrisene hadde tilfredsstillende beskrivelse av ADL. Ca 2/3 av pasientene ble vurdert til å ha svært god nytte av sykehusoppholdet, og en av seks pasientene kunne ha blitt behandlet uten innleggelse i sykehuset. Mens sykehusspesialistene vurderte at 77 % av pasientene hadde stor nytte av innleggelsen, vurderte allmennlegene at bare 59 % hadde stor nytte av oppholdet. En av fire epikriser beskrev ikke hvem som hadde oppfølgingsansvaret,

Konklusjon studie I

Både innleggesskrivene og epikrisene manglet viktig medisinsk informasjon.

Innleggeskrivene manglet så mye informasjon at i mange tilfeller kunne dette representere en helserisiko for pasientene. Det var også dårlig samsvar mellom på første- og andrelinjenivå om hva som ble forstått som god kvalitet på innleggelsesskriv og epikriser. Det var heller ikke enighet om hvilke pasienter som hadde god nytte av sykehusoppholdet.

Studie II

Bakgrunn

Formålet med studien var å sammenlikne bruk av helse- og omsorgstjenester, kostnader og død under seks og 12 måneders oppfølging av pasienter sluttbehandlet på en intermediæravdeling i sykehjem med tradisjonell behandling i sykehus.

Materiale og metode

I en randomisert kontrollert studie ble 142 pasienter over 60 år innlagt St. Olavs Hospital for akutt sykdom eller forverring av kronisk sykdom slutt- og etterbehandlet på en intermediæravdeling i et sykehjem eller på sykehuset. Intervensjonsgruppen, 72 pasienter, ble mens de var innlagt på sykehuset, randomisert til sluttbehandling på sykehjemmet, mens sykehusgruppen, 70 pasienter, ble randomisert til standard viderebehandling på sykehuset. Resultatene er basert på intention-to-treat analyser og justert for alder, kjønn, ADL og diagnoser.

Resultater

Reinnleggelser

I intervensjonsgruppen ble 14 pasienter (19,4 %) reinnlagt sammenlignet med 25 pasienter (35,7 %) i sykehusgruppen ($p=0,03$).

Resultater etter seks måneder

Etter seks måneder var det 18 (25,0 %) klarte seg selv i intervensjonsgruppen sammenlignet med syv (10,0 %) ($p=0,02$) i sykehusgruppen. Det var en ikke signifikant reduksjon av antall døde i intervensjonsgruppen med en ikke signifikant økning i dager innlagt i institusjon for den initiale behandlingsperioden.

Samlede gjennomsnittlige behandlings- og omsorgskostnader per pasient var for de første seks månedene NOK 78632 (95 % CI 59168-98096) i intervensjonsgruppen sammenlignet med NOK 112568 (95 % CI 85736-139392) i sykehusgruppen ($p=0,003$). Gjennomsnittlige forskjell behandlings- og omsorgskostnader per pasient og observasjonsdag var NOK 296 (95 % CI 8-568) ($p=0,003$).

Resultater etter 12 måneder

Etter 12 måneder var 13 (18,1 %) døde i intervensjonsgruppen og 22 døde (31,4 %) i sykehusgruppen ($p=0,03$). Pasientene i intervensjonsgruppen var under observasjon i en lengre tidsperiode enn sykehusgruppen: 335,7 (95 % CI 312,0-359,4) sammenlignet med

292,8 (95 % CI 264,1-321,5) dager ($p=0,01$). Det var ingen statistiske forskjeller i behovet for kommunal langtidsomsorg, antall sykehusinnleggelse eller dager i sykehus mellom gruppene.

Gjennomsnittlige behandlings- og omsorgskostnader per pasient og observasjonsdag var NOK 606 (95 % CI 450-761) i intervensjonsgruppen sammenlignet med NOK 802 (95 % CI 641-962) i sykehusgruppen ($p=0,03$).

Konklusjon studie II

Sluttbehandling på intermediært nivå i et sykehjem medførte færre reinnleggelser, at flere pasienter klarte seg selv uten kommunale omsorgstjenester og lavere mortalitet. Samtidig var behandlingstilbudet kostnadseffektivt.

Acknowledgments

These studies were given financial support, in the form of grants, from The Norwegian Association of Local and Regional Authorities (KS) and from Central Norway Regional Health Authority.

The Municipality of Trondheim and St. Olavs University Hospital supported the study at Søbstad Teaching Nursing Home by allocating resources to the Intermediate ward in the Nursing Home.

I believe that the close cooperation between the primary care service in the Municipality of Trondheim and the specialist care at St. Olavs University Hospital is the most important factor for the success of the intermediate department and to the possible success of my work.

Roar Johnsen is the principle tutor for the work presented in this thesis, and he is also responsible for introducing me to the field of academic evaluation of health services. Roar has given me optimal personal and scientific support from well before the start and until the completion of this thesis.

A special thank you to Tor Åm, Chief Executive Officer in the Municipality of Trondheim, who introduced me to public health in a larger Norwegian society, and has given me generous opportunities to do research and to develop my own ideas within the health care services in the municipality of Trondheim.

The most critical part of the trial at Søbstad Teaching Nursing Home was to recruit patients and collect exact information from and about the participants of the study. I want to express my gratitude for the excellent and accurate work done by all the staff at Søbstad.

I also want to express my gratitude to Lisbeth Kystad and Jorunn Mediås who managed to establish the intermediate department, put in place all the necessary procedures, do all the training programmes and to inspire, with the manager of Søbstad Birgit Reisch, all the employees in an incredibly short period of three months in the autumn of 2002.

This thesis has been made more readable due to the efforts of Linda J. Allan Blekkan who has tried to lead me through the subtleties of the English language.

And finally to my family

I still wonder how my family managed to live with me while I was doing the study, writing the articles and the thesis most of which was done in the late evenings and during holidays; thank you to you all!

Hommelvik, October 18th 2007.

Helge Garåsen

List of papers

The thesis is based on the following papers:

Garåsen H, Johnsen R: The quality of communication about older patients between hospital physicians and general practitioners: a panel study assessment.

BMC Health Services Research 2007,7:133.

Garåsen H, Windspoll R, Johnsen R: Intermediate care at a community hospital as an alternative to prolonged general hospital care for elderly patients: a randomised controlled trial.

BMC Public Health 2007,7:68.

Garåsen H, Windspoll R, Magnussen J, Johnsen R: Eldre pasienter i sykehus eller i intermediæravdeling i sykehjem. En kostnadsanalyse. [In Norwegian]. [A comparative cost analysis of care for elderly in a general hospital or in an intermediate care department in a community hospital.]

Tidsskr Nor Legeforen 2008,128:283-5.

Garåsen H, Windspoll R, Johnsen R: Long-term patients' outcomes after intermediate care at a community hospital for elderly patients: 12 months follow-up of a randomized controlled trial.

Scandinavian Journal of Public Health 2008,36: 197-204.

Definitions and abbreviations

ADL	Activities of daily living
CI	Confidence Interval
DRG	Payments by Results (the Norwegian system)
EUR	Euro
HER	Electronic health records
IP	Individual Plan
GDP	Gross Domestic Products
LEON	“Laveste Effektive Omsorgs Nivå” (Lowest Level of Effective Care)
NHS	National Health Service
NOK	Norwegian Kroner
OECD ¹	Organisation for Economic Co-operation and Development
OR	Odds ratio
RCT	Randomised controlled trial
REK	Regional Ethical Committee for Medical Research
SD	Standard Deviation

Definitions of Community Hospital - Cottage Hospital - General Practitioners Hospital - Intermediate Department - Nursing Home; see chapter 1.11 page 16.

¹ Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Turkey, United Kingdom, United States.

1.0 Introduction

1.1 Are older patients treated properly?

During spring 2001 several older patients in medical departments at St. Olavs University Hospital were defined to be long-term nursing home patients. However, they had to remain in the general hospital for several weeks waiting for beds to become available at nursing homes. Some of these patients were transferred to empty beds in the heart clinic at St. Elisabeth's Hospital, and, according to anecdotes from the nurse coordinating the use of nursing homes' beds in Trondheim, after a while many of these patients improved their functional status (ADL) and were therefore able to return to their own homes.

At the same time the municipality established a "transit- nursing- home" where patients could stay while they were waiting for long-term nursing home beds instead of remaining staying at the general hospital. Annual reports surrendered by the manager of this department described that as many as 20 % of these patients could return to their homes after spending a number of weeks at the "transit-nursing home".

These stories about older patients defined as nursing-home-patients improving their functional status and returning home after spending time in stimulating surroundings, made me, as Chief Medical Officer, and my leader, the Chief Executive Officer, wonder if there might be a missing link in the chain of care; i.e. something was possibly missing in "the chain of care" between the general hospital and community care.

1.2 Older people and medical care

Western societies are spending an increasing share of national budgets on health care consumption (1). In many of these societies health and social care services are under severe financial pressure and hospital beds are being closed and staff is being shed, this is indeed the case in the UK and Norway (2-3).

In the coming decades there will be an increasing number of older people in all Western societies (1,4), in particular there will be a large increase in the number of those above 90 years of age by 2020, and by 2025 there will also be a rather dramatic increase in the number of people above 80 years of age (1,4). People are living longer, and most of the elderly persons are functioning better and better in their daily activities. Nevertheless, the proportion of hospital beds being occupied by older patients in all Western European countries is

increasing (1,5-7). About 44 % of all beds in medical departments in Norway (2005) are occupied by patients above the age of 75 (6). As a consequence elderly patients' consumption of hospitals' health budgets are increasing (7).

There is also an increase in usage and expenditure for the provision of community care services. Nursing homes and home care consumed 25.2 % of the total health resources (running expediencies) in 2005 in Norway (7), nearly as much as secondary and tertiary level hospital care (29.6 %).

Both in the UK and Norway there are the additional challenges posed by Payment by Results, where tariffs in general and university hospitals are set on a diagnosis and procedure-based system, which does not take into account increased lengths of stay for patients with physical disabilities (2, 8)

In the UK the number of persons with physical disabilities and "a high level of need" is expected to increase by 54 % by 2025, most of these will be elderly (9). In addition to the loss of health and function for the patients and the social and economic burden for their families, this increase (the numbers) is considered to be a major economic challenge for societies worldwide.

The question of optimal organisation of care and rehabilitation of hospitalised elderly patients has been discussed among professionals both nationally and internationally in recent years (10-14). In a research report from HELTEF in Norway in 1999 the importance of improved organisation of the "chain of care" for the elderly was mentioned as an important factor to reduce the number of admittances to general hospitals, especially readmissions, of older patients (15). One of the conclusions in the report from HELTEF is that the pressure on general hospital beds is dependent on the competence of and cooperation between staff at both primary and secondary care level.

Several national and international studies have demonstrated better patient outcomes when older patients have been treated at geriatric departments (10-11), by geriatric specialist intervention for older medical inpatients (12), at rehabilitation departments (13) or for selected patients' groups at community hospitals (14). A randomised trial of early supported hospital discharge and further rehabilitation at home for stroke patients in Trondheim has

documented the benefits of using multidisciplinary teams, close cooperation and communication between primary and secondary care levels (16).

1.3 Health care consumption among older people in Norway

All Norwegian hospitals have experienced an increase in the number of admitted older people in the last 10 years (17). In 2004 patients above 70 years of age consumed 31.2 % of all patients' days in hospital (18). According to Statistics of Norway the rates in use of hospital beds among patients above 80 years of age have increased from 428.41 admittances per 1000 inhabitants in 1995 to 608.37 in 2003 (19). Patients above the age of 80, 4.7 % of the total population (20), occupied 15.3 % of all patient days in hospitals in 2005 (19). At the same time there has been a reduction in the average number of days in hospital for all patients groups, from 6.8 days in 1994 to 5.2 days in 2004 (21).

The number of patients in need of primary health care is also high and increasing (22-23). Romøren estimated in 2001, in his doctoral thesis from the municipality of Larvik, that 52 % of the inhabitants above 80 years needed community health care, and 14 % needed extensive care (24). In the city of Trondheim 24.7 % of persons between 80-89 and 43.0 % above 90 years of age received home care in October 2006. At the same time 11.6 % of the population between 80-89 of age and 43.3 % above 90 were in long-term nursing homes in Trondheim (25).

Annual reports from the municipality of Trondheim and St. Olavs University Hospital revealed an increase in hospitalised patients in need of nursing home care from 385 patients in 2001 to 515 in 2003, an increase of 33.8 % in three years (26-28). The number of elderly above the age of 80 in Trondheim has increased by 18.6 % from 1995 to 2005 (25,29). During the same period the number of nursing home beds increased with 1.0 %, from 1189 to 1200 beds (28,30), and the number of individuals receiving home care services increased by 18,8% from 2400 to 2850 individuals. In Trondheim, as in the rest of Norway, a further large increase is expected in the number of persons above 80 years during the next two decades; from 6345 in 2006 to 7450 (17,6 %) in 2025 (25,31).

1.4 Financing and organising of health care in Norway

Health care provision in Norway is based on a decentralised model. The state is responsible for policy design and overall capacity and quality of health care through budgeting and

legislation. Norwegian health care is divided into three levels: Primary level (community level), secondary level (general hospitals and specialist care) and tertiary level (university hospitals). By far the major part of the Norwegian health care system is organised and financed by the public sector.

The government owns and runs general and university hospitals, ambulance services and also all specialised health care delivered through regional health authorities (five regions).

The municipalities are responsible for primary health care, both curative and preventive: all home care, nursing homes, (community hospitals), family physicians, and health centres for mothers, children and youth, school health services, midwives as well as emergency services and physiotherapists and occupational therapists.

The county authorities are responsible for providing public dental services.

General and university hospital care and home nursing care is free of charge. Practical help in patients' homes (cleaning, shopping etc) costs from NOK 75 to NOK 1450 per month and is means tested. Nursing homes costs 75 – 85 % of each person's personal income, whereas appointments to family physicians and specialists at outpatient departments cost from NOK 150 to NOK 350 per appointment (32).

Expenditure per day, per patient or per hour can be calculated from the hospital or the community accounts.

However, there is no national system for financing care at an intermediate level.

1.5 Description of an expert panel – the nominal group technique.

The nominal group technique uses a highly structured meeting to gather information using relevant experts. It consists of rounds where the panellists rate, discuss, and then rerate a series of questions or items. The technique was developed in the USA in the 1960s (33).

In medicine there are a lot of evidenced based recommendations; e.g. clinical indicators for prescribing medicines in general practice (34) and guidelines for cardiovascular disease prevention in women (35). Typically these recommendations are the result of work done by recognised experts in their respective fields nominated by representative authorities and organisations to work in an expert panel.

When composing an expert panel, it is crucial that the expertise reflects the field to be examined (36).

1.6 Description of the Delphi technique

The Delphi process gets its name from the Delphi oracle's skills of interpretation and foresight and proceeds in a series of rounds between the panel members (36). It is a group facilitation technique, which is an interactive multistage process, designed to transform individual opinion into group consensus (37-38). This involves the administration of two or more rounds of questionnaires and one or more expert panels. Panellists are selected according to their relevant expertise; statements on a given issue are developed either by the panel member or researchers. The panellists are asked to rate statements individually, by questionnaire, with results feedback between rounds in the panel until an acceptable consensus is reached.

1.7 Definition of an older patient in Study I and Study II

In Study I an older patient was defined to be a geriatric patient, i.e. 75 years or older. In Study II an older patient was defined to be 60 years of age or older. Before the study started there were discussions between physicians as to whether the term "older patients" should be defined as being pensioners (from 67 years of age) or as geriatric patients (above 75) as the latter is the age group occupying the highest proportion of the beds in medical departments at Norwegian hospitals. We concluded, however, that it was problems in performance of daily activities, a consequence of his disease(s), that was the most important issue in study II and not age and therefore decided to have a broad age approach in our study.

1.8 Description of Community Hospital - Cottage Hospital - General Practitioners Hospital - Intermediate Care Department - Nursing Home

Community hospitals, cottage hospitals, general practitioners hospitals and intermediate care departments are different names for primary level, low technology units for clinical observations, treatment ("cure"), rehabilitation and care of patients in need of more intensive medical care than can be provided at home or at standard nursing homes when the patients do not need general hospital care (39-47). Nursing homes are nurse-managed care institutions

where patients generally need care services due to chronic disabilities, age, dementia and/or low ADL.

1.8 Description of intermediate care

The intermediate care ward at Søbstad Teaching Nursing Home, a community hospital (39,47), has specially trained health personnel as well as medical and laboratory equipment to provide care for patients who would otherwise need prolonged general hospital care. This includes increased number of trained nurses, from 12.5 to 16.7 full-time positions per week and doctors' hours from 7 hours to 37.5 hours per week compared to traditional nursing homes. The department also has intravenous pumps, equipment for continuous blood oxygen-saturation monitoring as well as laboratory equipment to measure infectious variables, haemoglobin and blood glucose.

Individualised intermediate care provides systematic evaluation and treatment of each patient's diseases with the main focus on monitoring and improving the patients' capability to manage daily life activities (ADL) in close cooperation with the patients' families, home care, occupational therapists, physiotherapists and general practitioners.

The intermediate care profile at Søbstad is almost the same as in the definition of intermediate care produced by British Geriatrics Society (48):

1. Services targeted at people whom would otherwise face unnecessary prolonged hospital stays for inappropriate admissions to acute inpatient care, long-term residential care, or continuing NHS inpatient care.
2. Services provided on the basis of a comprehensive assessment resulting in a structured individual care plan that includes active therapy, treatment and opportunity for recovery.
3. Services, which have a planned outcome of maximizing independence and typically enabling patients/users to resume living at home.
4. Services which are time limited, normally no longer than six weeks, and frequently as little as one or two weeks.
5. Services, which involve cross-professional working, with a single assessment framework, single professional record, shared protocols.

1.8 Are there any alternatives to general hospital care?

There are neither any standardised guidelines on how to perform care at nursing-homes or community hospitals as alternatives to admissions to general hospital or as follow-up after discharge from general hospitals, nor how to perform suitable community home care as alternatives to inpatient care for the elderly.

Some questions have to be addressed when considering alternatives to general hospital care:

- Is it a real alternative or rather a supplement?
- Is it a better management alternative or rather an increase in activity?
- Is it cost effective compared to standard general hospital health services?
- Will it provide equivalent or better patient outcome (mortality, functional status and quality of life)?

In order to find better models for collaboration, the municipality of Trondheim and St. Olavs University Hospital have, in the course of the last thirteen years, systemised collaboration through formalised agreements (39,42).

1.9 Alternatives to general hospital care - The Trondheim Model

As a result of the collaboration between the municipality and the city general hospital, several new models for patient care have been established and evaluated in Trondheim (16,39-40). Extended stroke unit service and early supported discharge (16) have demonstrated the high level of efficiency of close collaboration between community health care and hospital specialists resulting in better patient outcomes. Other examples of this collaboration are the palliative care ward at Havstein Nursing Home (39-40) where close collaboration has made it possible to provide care to cancer patients at primary level with patient outcome comparable to general hospital care (40), and later on the intermediate care department at Søbstad Teaching Nursing Home (39). Both at Søbstad and at Havstein St.Olavs University Hospital contributes 3 million NOK per year and thereby partially finances the increased costs for the municipality.

This thesis is based on methods and results from two studies. First, in Study I the quality of referral and discharge letters between general practitioners and general hospital physicians (paper I) was explored as a pilot study to the main trial.

The main study, Study II, was a randomised controlled trial where patients aged 60 or more, hospitalised due to an acute illness or an exacerbation of a chronic disease, were randomised to intermediate care at Søbstad Teaching Nursing Home (i.e. community hospital) or to standard prolonged general hospital care at St. Olavs University Hospital.

Intermediate care at a community hospital was compared with standard care at the general hospital on morbidity assessed as number of readmissions, the need for home care and long term nursing home, mortality and the number of days in institutions (paper II), resources and costs (paper III) and patient outcome after 12 months (paper IV).

2.0 Background

2.1 The demand for health care among older people in the future

Among the population of elderly above 80 years of age two out of three are women and three out of four live at home. Twice as many are in good health as have reduced ADL due to health problems (49). Prognoses about health services consumption in the future, and as to whether there may be changes to disability-free life expectancy are unclear. In Western countries, with low mortality risk related to most diseases, we will probably get an increase in community health expenditures due to the increased numbers of long living, chronically ill, elderly (50). However, a continued trend towards increasing medicalisation and a further increase in specialised care for all kinds of complaints can also escalate general hospital costs, especially if terminal care is to be provided in general hospital beds (50).

In Sweden there are large regional differences in where people die, in general hospitals, at home or in nursing homes (51). The main reasons for these differences are probably the organisation of the chain of care (general hospitals and community health), the collaboration between the general hospitals and community care and the distances to general hospitals. Even if 50 % of patients in Sweden die of cardio-vascular diseases, the Swedish health authorities have calculated that 80 % of all patients die “a slow death”, i.e. most elderly people live months or years with diseases before they die (51).

In the publication Scenario 2030 the Norwegian Board of Health (Helsetilsynet) has concluded that the most common diseases among elderly patients will increase by 40 to 60 % by the year 2030 (49).

In Great Britain a report by an expert team at the University of Leicester (9) has used data from the MRC Cognitive Function and Aging Study, a national representative sample of people aged 65 and over, and have explored the effect of different health scenarios on the future numbers of older people with disabilities. The team concluded that the ageing of the population alone, with no alteration in the prevalence of the diseases (dementia, stroke, coronary heart diseases and arthritis) will result in a 67 % increase in the numbers of disabled over the next 20 years. This report also considers that the effects of improvements in population health from reduction in levels of obesity and other health behaviours, control of vascular risk factors, better treatments or technologies, could considerably reduce the numbers of disabled older people; nevertheless the numbers of disabled people will still increase by 57 % (9).

An OECD report has suggested that in 13 countries, where data are available, an aging population will create an increase in age-related social expenditures from an average of under 19.5% of Gross Domestic products in 2000 to almost 26 % of GDP by 2050, with old-age pension payments and expenditure on health care and long term care each responsible for approximately half of this increase (1,52).

2.2 A revisit to the principle of LEON

In all Western societies modern health care consists of many different professions, specialised general and university hospitals, rehabilitation units and several different care alternatives at community level and at secondary level. As a consequence many patients can be exposed to a large number of different health personnel, providing different kinds of care that is not always coordinated in the space of a short period of time. This is especially the case for the elderly.

One important future issue will be to develop better understanding of when patients need care at a general hospital, at a community hospital, at a nursing home, by home care or treatment at an outpatient department, by a general practitioner or a multiprofessional team.

Primary and secondary level care providers also need to achieve consensus on when a patient is ready to be discharged from a general hospital. In a Swedish white paper “*Døden angår oss alla*” (“Death concerns us all”) (51), it is concluded that the definition “ready to be discharged” or “medically finished care at a general hospital” is an administrative decision that is dependent on several different factors; for example:

- How many beds are available?
- How many other patients are admitted?
- What kind of care is available at other general hospitals or in community care?
- The competence of the physicians and the resources at the general hospital.
- The competence of the health professionals at primary level.

The city general hospital (RiT; = St. Olavs University Hospital) and the municipality of Trondheim developed their own set of criteria in 1994, which is still in use, defining when a patient is ready to be discharged (53):

- Before being defined ready to be discharged the disease(s), which was the reason for admission to the general hospital, must be examined and treated properly.
- Functional problems caused by the disease(s) must also be examined and treated properly.

In England there have been discussions for several years on what decent level of health care for older people might be (54). The British service framework for older people, from 2001, has set out standards to improve the experience for older people and their carers who use health care, social care and other services. However, care for older people in Britain is, in 2006, not yet integrated and still remains fragmented, and therefore services have made limited progress towards the frameworks’ targets (54).

2.3 Patients’ rights

Several countries, e.g. Sweden (55) and Norway (56), have implemented legislation on patients’ rights as far as health care provision is concerned.

The objective of the Norwegian law is to ensure that the population has equal access to health care of good quality by granting patients individual rights in relation to health services. The provisions of the act are intended to contribute to the promotion of a relationship based on

trust between the patient and health services while having respect for the individual patient's life, integrity and human worth.

The patient is entitled to emergency medical services and is entitled to receive necessary health care from the municipal health service and to receive necessary health care from the specialist health service. The health service must give anyone who applies for, or who needs health care, the medical- and care-related information he will need in order to safeguard his rights.

The right to health care only applies if the patient can be expected to benefit from the health care, and if the costs are reasonable compared to the expected effect that can be gained from the proposed medical measures.

The patient is entitled to participate in the implementation of his medical care. This includes the patient's right to choose between available and medically sound methods of examination and treatment. Participation must be adapted to the individual patient's ability to give and receive information. If the patient is not capable of giving an informed consent, the patient's next of kin is entitled to participate on behalf of the patient. However, it is the clinicians that make the final decisions.

Both the Swedish and Norwegian acts stress that care must, as far as possible, be conducted and designed in consultation with the patient. However, the Swedish system is still characterised by professional paternalism (55).

2.4 Where do the patients want to get care?

A study from Denmark (57) compared the older patients' ADL statuses with where they were living prior to, and after, being hospitalised. In this study the authors concluded that older people with a high ability to cope with daily and social activities wanted to stay in their own homes and have control over their own future. Leland, in his master's thesis from 2001, discussed if the possibility, and ability, to live in a person's own home is an important value by itself, worth fighting for and if it by itself strengthens older people's ability to cope (58), i.e. an important factor according to Antonovsky's theories about sense of coherence (SOC) (59).

In the summer of 2006 2431 people aged 55 or older in Trondheim answered a questionnaire about where they wanted to live when they got older and had a loss of function (60). Almost two third, 63.6 %, wanted to stay in their own home if their health did not deteriorate too much. If they in the future had to move because of health problems, 45 % wanted to move to sheltered housing receiving care from the home care service and only some 20 % wanted to live in nursing homes (60). In a national survey in 2005 the Norwegian Institute for Urban and Regional Research (NIBR) found that only 6 % of Norwegians between 53 and 78 years of age wanted to move to a nursing home at some point in the future (61).

Modern treatment procedures no longer use age as an absolute criterion for care (62-63). A Cochrane report concludes that there is not enough evidence to tell if regional anaesthesia is superior to general anaesthesia when operating the elderly for hip fractures (62). A Danish study, on 774 patients 70+, comparing coronary angioplasty and coronary artery bypass surgery on older patients during a five-year period from 1999 to 2003 showed a large increase in the number of operations (63). However, above 80 years of age coronary angioplasty is preferred because of lower frequency of complications.

2.5 Quality of the written communication between health personnel

The effectiveness of patient care is largely dependent of the quality of the communication between physicians, i.e. via both referral and discharge letters. There is consensus between clinicians on the structure of referral and discharge letters (64-65). In Norway there is even a national standard describing the content of discharge letters (65). Still, there are some studies showing that older people regularly have been incorrectly treated, as hospital staff, general practitioners and home care services do not exchange necessary and/or sometimes even exchange incorrect medical information about the patients (64-68).

National and international studies show that the content of discharge letters does not meet the general practitioners' and home care's requirement for reliable information to adequately follow up patients with complex diseases and/or multiple medication use (69-74).

Internationally there are major concerns about the quality of the written communication involving the transfer of duties and obligations from one responsible person or medical team to another (71-72). Some studies have shown that initial short reports (74), joint charts (75),

structured communication formulas (76) or electronic interactive referrals (77) have only partially improved the quality of communication between physicians.

2.6 Inappropriate admissions and discharges

One of the first studies on inappropriate general hospital admissions was in Birmingham where the conclusion was that about a quarter of the admissions had no need of diagnostic or therapeutic requirements at a general hospital level (78). One of the first Norwegian studies on the medical benefits of general hospital care was published in 1983 where as much as 35 % of the patients admitted to Kirkenes Hospital, were assessed to have no benefit from the admission (79).

In USA a rapid rise in expenditure for the Medicaid and Medicare programs in the early seventies initiated studies of inappropriate hospital admissions (80), and even the development of an Appropriateness Evaluation Protocol intended to identify inappropriate hospital stays (81). Payne et al. reviewed, in 1987, the results of studies of inappropriate admissions in USA (82). She found that inappropriate admissions ranged from 10 to 40 % in studies using the Appropriateness Evaluation Protocol.

A study at Aker University Hospital, Oslo, published in 1990, on 980 consecutive admissions to the medical department showed that even if 88 % of the patients' requirements could have been met at a general hospital, 59 % of all the patients were treated in specialised units (83). For 41 % of the patients above 70 years of age the main reason for admission was the patients' acute illness or a deterioration of chronic diseases. In this study around 20-25 % of the patients in the medical department were waiting for home care or nursing home services. Discharging physicians assessed that admissions to the department of internal medicine at Diakonissehjemets Hospital in Bergen could have been avoided in 42 % of the cases as only 58 % of the admissions were assessed as appropriate (84). The study also showed that 23 % of the total inward-time capacity could have been released if no patients waited more than 50 days for a place in a nursing home.

These two Norwegian studies used the physicians' clinical judgment without any explicit evaluation criteria (83-84).

Eriksen in Tromsø, Norway evaluated the benefits gained from general hospital admissions using expert panels consisting of one internist, one surgeon and one general practitioner

assessing the gain in life expectancy and quality of life for admitted patients to the University Hospital in Tromsø (85). He found that 81 % of the admissions led to some improvement in health-related quality of life. Diagnosis was the most important predictor of benefit, but high age and emergency admissions were also independently associated with a higher level of benefit. Eriksen found that 24 % of the admissions were inappropriate. However, he found that it was very difficult for clinicians to identify which patient admissions might be inappropriate at the time of admission, and Eriksen concluded that excluding the supposed inappropriate admissions would not lead to a proportional cost reduction (86-87).

2.7 The cost of health care for patients with a poor prognosis

Several studies on the costs of health care have been published. Results indicate that the average cost of services provided for patients with a poor short or a long-term prognosis is higher than for other patients (88-91). Repeated hospitalisations for the same disease were more characteristic of the expensive patients than single cost-intensive stays (88). However, Pompei et al concluded “*The impression of clinical judgments at time of admission in predicting long-term outcome argues for aggressive management of acutely hospitalized patients when there is any doubt about their prognosis*” (89). Since the introduction of Medicare and Medicaid in USA, studies have explored the fact that a disproportionately high percentage of the total expenditure is used on enrollees in their last year of life (90). Furthermore, resource utilisation increased as death approached; 46 % of expenses in the last year of life were used during the last 60 days (91-92). Similar results have been found in studies from Europe (93-94).

There is one study, by Scitovsky, relating the costs of health care in the last year of life to patients’ functional status (92). She found that hospital costs were markedly lower, but home care and nursing home cost were higher, for patients with low ADL scores. Scitovsky also concludes that the rise in medical care costs will require basic changes in the physician-patient relationship and in the general attitude towards death (92).

Yang et al investigated the relative contributions of both age and time to death to health expenditures on 25994 elderly from the 1992-1998 Medicare Current Beneficiary Survey Cost and Use files (50). They found that the main reason for the substantial increase in expenditure with higher age was due to the increasing mortality rates with age and that time to death was a main predictor for higher inpatient care expenditures. They concluded that the

predicted increases in per capita health care expenditure caused by longevity will be less than expected because of the concentration of expenditures at the end of life rather than during the extra years of relatively healthy life.

Yang et al also studied nursing home and home care expenditures (50). They found that nursing home expenditures are different from inpatient hospital expenditures. Nursing home costs increase steadily with age, regardless of whether people are in their last year of life or not. However there is a trend towards an increased rise in expenditure with closeness to death also in nursing home. Home care health expenditures increase steadily in the last three years of life, however, the differences between age groups is less than seen in nursing homes (50).

2.8 Interventions to reduce inappropriate health care for older people at hospitals

Community hospitals, cottage hospitals or general practitioner hospitals are usually low technology units for clinical observation and treatment of patients who need more intensive medical care than can be provided at home (43-44). The UK, the Netherlands and Norway all have experience with these kinds of hospitals. A cost study has been conducted at the first general practitioner hospital in the Netherlands (43). In this study the authors found that a general practitioner hospital might be a cost saving alternative to traditional general hospital care or nursing home care. However, the lack of a control group is a shortcoming for this study.

Emergency admissions accounted for 40 % of National Health Service bed usage in the UK (95). During recent years there has been a policy to increase the role of intermediate care with the use of community hospitals. In a prospective cohort study in Devon, UK, 254 patients were followed six months after treatment for an acute illness requiring general hospital admission, but with a condition that could have been treated at either a community hospitals or a district general hospital. Results showed that quality of life and mortality were similar in both groups (95).

Another British study (14) showed, however, that care in a locally based community hospital was associated with greater independency for older people than care at a district general hospital.

Hensher et al (96) describe that there are several methods to facilitate early discharge from hospitals. These include discharge planning, nurse led inpatient care, patient hotels, community or general practice hospitals, nursing homes and hospital at home schemes. Hensher writes that discharge planning and the use of nursing homes have often been overlooked as alternatives, and he claims that little rigorous research has been conducted on any of these alternative methods (96). Hensher reviewed five randomised controlled trials of hospital at home regimes where there were no differences in patient health outcomes (mortality, functional status, and quality of life) for patients in the “hospital at home regimes” compared with patients receiving standard general hospital care. However, the evidence pertaining to costs of hospital at home is mixed; one study finds expenses are higher (96) and another no difference between hospital at home regimes and hospital care (96).

A group from the European Working Party on Quality in Family Practice (EquiP) has stated that there is a need for changes in the system of care as well as in the way doctors see their own role and their performances (97). EquiP has outlined recommendations on how cooperation between general practitioners may be improved (97). However, there have been no assessments to follow-up if doctors are, in fact, following these recommendations. Kvamme showed in his doctoral thesis that better cooperation and communication between general practitioners and general hospital physicians can reduce unnecessary admissions (98).

Finnmark County in Norway has long experience using general practitioner hospitals (GPH). In a study from Finnmark, Aaraas showed that adverse effects of transitory stays at general practitioner hospitals were uncommon and moderate, and were balanced by the benefits of early access to care for critically ill patients (44-45). 45 % of the patients were assessed as candidates for general hospital care if the GPH had not existed as a “buffer” against general hospital admissions (45).

In Trondheim, Norway, Fjærtøft et al compared early supported discharge of stroke patients to traditional inpatient care and rehabilitation (99). They found that this programme reduced the length of institutional stay without increasing the costs of outpatient rehabilitation compared to traditional stroke care.

In California a randomised trial of annual in-home comprehensive geriatric assessments for older people aged 75 or more, living in the community, showed a possible delay in disability and the need for nursing home care (100).

A study in Denmark has shown that acute admissions to nursing homes instead of general hospital care were appropriate only in a very small number of cases (101-102).

There have also been studies of nurse led intermediate care versus standard care at general hospitals (103-104). The conclusions so far are that nurse led intermediate care led to longer hospital stays (103) and were significantly more expensive (104- 105). However, none of the studies assessed whether patients were better prepared for discharge when using this model of care.

2.9 Transferring duties from hospitals to primary care

Health and social care services are under severe financial pressure in most Western countries. There are, at both national and international levels (106), discussions on how to provide care for older people the next 20 years that will supply the high-quality outcomes sought when the “baby-boomer” generation approaches the age of retirement (106).

A white paper from the NHS, in the UK, (107) discusses a new direction for care; e.g. proposing:

- Better prevention
- More long term care has to be given in the home instead of at nursing homes
- More care undertaken outside general hospitals.

As in England, health professionals and politicians in Norway have for several years been discussing how cooperation between primary and secondary care can reduce the pressure on general hospital beds (108). However, most of the proposals so far have simply described how to transfer tasks and duties from general hospitals to community care. Several elucidations have been made by the central health administration in Norway (Ministry of Health and Social- and Health Directorate) that have laid out care programs, and/or care guidelines, developed by specialists and bureaucrats. However, these guidelines instructing primary care givers how to treat patients; e.g. guidelines for treating schizophrenic patients (109) and respirator patients (110) on primary level has been proposed without consultation with primary level professionals.

Even though the intentions of different white papers were to provide better patients’ care, there remain many uncertainties as to which form of care delivery is the most cost-effective.

In an editorial in BMJ in May 2006, the chair of British Geriatrics Society Policy Committee, discussed the subject of what “*Decent care is for older people*” (54). She describes care provision in England that is not integrated; patients are moved quickly through the emergency system towards discharge –“a hit and run approach”- with poor communication with community services. Another problem, according to this editorial, is who should decide what is the most appropriate level of care: Is it the primary or the secondary level health professionals? (111).

2.10 A silent paradigm shift – from general hospital care to primary care

During the past 20 years there has been a considerable transition in Norwegian health care from general hospital care to municipality care (108). In 1980 72 % of all health personnel worked in health institutions and 28 % in home care. In 2004 48 % worked in institutions whereas 52 % in home care (108). In 1984 there were 18418 somatic general and university hospital beds versus 13995 in 2005 (112-113), There were 18320 nursing home beds in 1984 versus 38996 in 2005 (114-115). In 1984 there were 100957 persons receiving home care versus 164645 in 2005 (116-117).

This shift in care provision has happened without any serious, in-depth, discussions among politicians and health professionals of the extent of public responsibility and what is deemed to be a mandatory level of care for the patients. There have neither been any studies or large-scale evaluations of this transition of care nor investigations into which is the most cost-effective form of care provision (108).

2.11 The chain of care – is there a missing link?

Since 1993 there has been a close collaboration between managers and clinicians in the municipality of Trondheim and at St. Olavs University Hospital (39,42). The main focus was, until 2001, mostly older patients who remained in the general hospital waiting for admittance to nursing homes having been defined as “ready to be discharged” from the general hospital.

In spring 2001 there were 70 patients in this category, waiting for places in nursing homes, at the general hospital. Because of this unpredicted situation the general hospital and the community established an expert group of clinicians to attempt to find alternative solutions to

general hospital care. One of the conclusions from this group was to establish an intermediate care department at a nursing home. The expert group concluded (unpublished report) that:

- During the last ten years an increasing proportion of older patients have been referred to the city general hospital.
- Older people often wait in long queues for: elective general hospitalising, appointments at outpatient departments, general practitioners, home care, rehabilitation units and nursing homes.
- There is a huge and increasing gap in technical equipment used and qualifications to be found at the general hospital and in primary care.
- There exist no care options between traditional general hospital and primary health care where older patients can get both “cure and care” with specially qualified health personals at an intermediate level.
- There is probably “a missing link in the chain of care”.

Administrators at the general hospital and in the municipality decided, in autumn 2001, to establish a community hospital with 20 beds (39) to provide intermediate level care (47-48). The community hospital would provide intermediate level care for older patients initially admitted to the city general hospital, but who have no need for further advanced general hospital care. The aim was to create a department that could function as a new link between general hospital care and community home care to optimise recovery before the patients returned home (39). The main hypothesis was that intermediate care at a community hospital (an upgraded nursing home department/ward) compared to traditional prolonged care at a general hospital would reduce morbidity as well as the need for home care and long-term nursing home care.

3.0 Objectives and hypothesis

3.1 The main objectives of the thesis

1. To evaluate the quality of referral and discharge letters between physicians for patients referred to cardiologic, orthopaedic and pulmonary departments at St. Olavs University Hospital.
2. Through an evaluation of referral and discharge letters:

- Estimate the proportion of patients that could have been treated without being admitted to a general hospital; i.e. provided care by home care, in nursing homes, at outpatient clinics or by general practitioners.
 - Identify specific patient groups where care outside a general hospital department might be possible.
3. Through a randomised controlled trial evaluate the short and long term effects on patients' outcome of intermediate care at a community hospital compared to standard prolonged care at general hospital.
 4. Through a randomised controlled trial estimate if care provided at an intermediate level is cost effective in a health service perspective compared to standard prolonged care at a general hospital.

3.2 Hypothesis

The study was designed to test the following hypotheses:

1. Referral and discharge letters between physicians contain necessary and sufficient information to secure optimal patient care when transferring duties and obligations from one responsible person or medical team to another.
2. The number of unnecessary referrals of older patients to the general hospital is sparse, and there are no specific patient groups where care can be provided at primary level instead of at a general hospital.
3. Multicomponent care at an intermediate level at a community hospital will:
 - reduce morbidity assessed as number of readmissions
 - reduce the need for home care
 - reduce the need for long-term nursing homes
 - without to increase mortality
 - without to increase the number of days of inpatient care
 - provide care at a lower cost per patient

4.0 Patients and Methods

4.1.0 Study population. Study I - The quality of written communication between a general hospital and general practitioners

During a period of three weeks in February 2002 referral and discharge letters for 100 patients, both acute and elective, were included into the study. Patients 75 years or older from

the municipalities of Trondheim and Malvik admitted to orthopaedic (n=30), pulmonary (n=30) or cardiological (n=40) departments at St. Olavs University Hospital were included consecutively from February 1st until a sufficient number of patients was reached at each department. There were no exclusion criteria.

Secretaries at each hospital department collected copies of all referral and discharge letters for all patients as discharge letters were signed. Neither the general practitioners nor the general hospital physicians knew which patients were included in the study, as the time for inclusion was unknown to the physicians.

4.1.1 Study design

The objective was to study the quality of the written communication between physicians and the level of benefit from general hospital care. Two expert panels were recruited. Each panel consisted of one general hospital physician (geriatrician or an experienced internist), one general practitioner and one public health nurse. All participants in the panels were certified specialists in their respective fields. None of them had any affiliation with the departments involved in the study.

The two expert panels made assessments of referral and discharge letters within one to three weeks after the patients' discharge from the general hospital. Each panel member examined and assessed copies of referral and discharge letters individually before the panel held group discussions, and reassessed the current letter.

Twenty-five referral and discharge letters were evaluated by both panels; 15 from cardiological, five from pulmonary and five from orthopaedic departments. The rest of the referral and discharge letters were assessed by only one of the expert panels.

All data was blinded as to the patients' identity (name, birthday and address) and the physicians' names.

At the start of the study, the panellists were convened to review the study protocol and for an explanation of both the Delphi technique (36-38,118) and the assessment method. A pilot study with five referral and discharge letters was performed confirming that the panellists mastered the assessment method and to enable a final adjustment of the evaluation schemes.

4.1.2 Assessments of outcomes

There are several international studies assessing written communication between physicians. Some earlier studies have assessed the quality of referral letters using questionnaires (64,70,73) or by audits (69). A Delphi survey with expert panels in a particular area of interest has been widely utilized in other fields in clinical medicine and health care services (36-38,118). It has proved to be an effective and reliable method in developing reliable judgments and criteria of quality guidelines (36-37).

4.1.2.1 Quality of referral and discharge letters

Referral letters from general practitioners to secondary care record the reasons for requesting a specialist consultation or care at a general hospital. Ideally the referral letters should provide sufficient information to enable decisions to be made about appropriate care and which patients should be prioritised to inpatient or outpatient care. Most critiques of referral letters have been from specialists assessing the referrals from a secondary care perspective, but even in a study where general practitioners evaluated other general practitioners' referral letters, quality was considered to be low (69). There are also several studies (70-76) describing the insufficient quality of discharge letters even when the content of the referral and discharge letters had been agreed between physicians beforehand (64-65).

However, there have been few discussions between different health professions about whom and what the letters should address:

- Is it a letter from one physician to another, for medical diagnosing and treatment of an illness (“cure”) just describing the most relevant medical facts surrounding the patients' situation?
- Is it a letter from a team of professionals to another describing the patient's disease(s) and the consequences of the disease(s) for the patient?
- Is it a letter that allows the recipients to optimise the patients' need for care in a broader social context including the patients' ADL?
- Is it a letter summarising what one professional or a team has done of actual diagnosing and care, functioning as a report and summary of the health journal, i.e. acting as a document fulfilling legal demands set by the health authorities?

As the study in question dealt with elderly patients with complex medical and social problems, it was decided early in the planning phase of the study that the primary outcomes should be relevant for different categories of health professionals at both community and general hospital level; i.e. both classical medical as well as more socially oriented fields in a broader health context. To deliver services according to the older patients' needs, all professions and teams have to cooperate with the patient, and all must understand and agree on the best form of follow-up care for each patient.

In fields where there is insufficient information and possibly contradictory interests, consensus methods can be reliable methods to synthesize information (36-37), so it was decided to combine the Delphi technique with the nominal technique (37,118).

When planning the study, we had some problems finding references using expert panels to assess outcomes as most of the earlier studies have used questionnaires. There were also some difficulties finding references to all of the relevant outcomes to our study. Nearly all earlier studies on the quality of referral and discharge letters have focused on physicians' needs or the inappropriateness of hospital stays based on hospital physicians' points of view, and not so much on the needs of the community health teams so that they and the patient himself can plan necessary home care. The assessments of the quality of the referral and discharge letters were performed on the following objects:

- Medical history
- Symptoms
- Signs
- Actual medical situation/status
- Medication
- ADL
- Reason for being hospitalised
- Social network
 - Family
 - Social functional ability
 - Home care
 - Family physician
- Follow-up responsibility

- The health benefit of the stay at hospital
- Could the patient be treated without being hospitalised
 - By a GP
 - At outpatient departments
 - At a nursing home
 - By home care
 - By other professionals
 - By social care services

The panels used a standardised evaluation protocol with a visual analogue scale (VAS) from one to eight (119–120). Before the main study began a pilot study, of five admission letters, was performed where the expert panels examined, discussed and tested the evaluation protocol thoroughly in two meetings.

Each panel member examined copies of referral and discharge letters individually. Consensus was defined to exist only if the difference between the group members did not exceed two on the VAS scale. If this criterion was met, the panel's evaluation was defined as being the median of the three group members. Otherwise, the case was discussed in a meeting, using the Delphi technique (36-38,118) with the participants of the panel and with the project coordinator (HG), as a mediator, the mediator took no active part in the discussion. This methodology was also used for cases evaluated by both panels. To show the level of consensus between the panels the agreement between the panels on the 25 referral and discharge letters evaluated by both panels was presented separately. The panels' consensus evaluation as well as each expert's evaluation was recorded for every referral and discharge letter.

4.1.2.2 Assessments of the benefits of hospitalisation

Before assessing the benefits achieved by care in a general hospital, it was necessary to consider what the consequences for the patient would have been if he had been treated elsewhere for his current problem. Benefits attributable to general hospital care could be classified according to five different criteria. One criterion was benefits for the patients, another benefits for other persons; e.g. a psychiatric patient displaying improper behaviour prior to treatment. Whilst a third criterion could be social benefits; e.g. ill people with nobody in their social network capable of assisting them at home. A fourth criterion could be gains in

quality of life and/or life expectancy. The final criteria was the patients' ability to manage his activities of daily living reflecting the patients need for care. This last criterion could be regarded as a part of quality of life; there is however a distinction as it is possible to experience a high quality of life even if receiving a high level of care.

For patients with chronic diseases one stay at a general hospital will never be satisfactory, and the they need several admissions to the general hospital or appointments at outpatient clinics. Even if a patient gains a health benefit from each stay, each stay will not be sufficient on its own.

In the present study health benefit was defined to be when the stay at the general hospital contributed to a better outcome of the patient's actual medical and /or physical condition. The expert panels were asked to assess, using their professional knowledge, if each included patient had had any medical benefits from the care received at the general hospital using a VAS scale (119) from one to eight.

4.1.2.3 Assessments of care level

In the Nordic countries it is stated that patients should be treated at the lowest effective economic care level (121-122). Nearly all of the tertiary level hospitals in Norway are also secondary level general hospitals/acute general hospitals, e.g. St. Olavs University Hospital in Trondheim. It is often difficult to define when a patient at a university hospital is treated at secondary or tertiary level, as there are no exact criteria defining the differences between these levels (83-87). However, some physicians at a general hospital consider it to be easy to determine when a patient can be treated by community care or at secondary level; though knowledge about the primary level care is often insufficient in general hospitals (53, 86).

4.1.2.4 Assessments of alternatives to general hospital care

Estimations of how many patients that could have been treated without being admitted to the general hospital were done by the panels, as well as estimations as to where this care could have been given.

When studying the literature, there are some references to the use of expert panels and Delphi techniques to assess the appropriateness of general hospital admissions (36-38,118). The use

of expert panels has in the past decade proved to be a well-documented method to create consensus-based care recommendations (36-38).

In this study the two panels were asked to consider which patients could be treated without being admitted to the general hospital based on the evaluation of referral and discharge letters.

4.1.3 Statistical analyses study I

Statistical software programs used were SPSS 14.0 and 15.0 (SPSS Inc., Chicago, IL, USA) and Excel 2003 for Windows. Statistical significance was set at $p=0.05$.

There were no sample size estimations as this study was meant as a pilot to study II. The included number of letters was chosen from a strict capacity approach as the panellists had limited time available.

The degree of agreement was calculated by using kappa (κ) (123). To investigate the structure of agreement between participants in each panel and between panels it was decided, during the assessments in the pilot study, to divide the assessments into three categories; low (1-3), intermediate (4-5) and high (6-8), and the results were tabulated against each other in contingency tables. All reproducibility assessments were performed according to these three categories.

Data was collected on all assessments of the 25 cases assessed by both panels for interrater and test reliability analysis. Agreement between the panels and within the panel was estimated as observed and proportional agreement along with kappa statistics (123-126). The summation of the 3×3 tables and calculations of agreement with confidence intervals (CIs) of kappa were performed in a Microsoft Excel model. Strength of agreement (value of κ) was defined as: very good (0.81 – 1.00), good (0.61 - 0.80), moderate (0.41 - 0.60), fair (0.21 - 0.40) and poor (below 0.20) (124). The distribution of concordance was also analysed with a Bland-Altman diagram (124,127-128).

4.2.0 Study population Study II – Intermediate care at a community hospital

From August 2003 until the end of May 2004 142 patients were eligible for inclusion, 70 were randomised to continued care in the general hospital (general hospital group) and 72 to the community hospital (intervention group) (Figure 1).

Before the trial started participating doctors at the general hospital working with general practitioners developed inclusion criteria through a Delphi technique (36-38,118); the author (HG) was facilitator to organise requests for proposals and proposals received, and was responsible for communication with the participants.

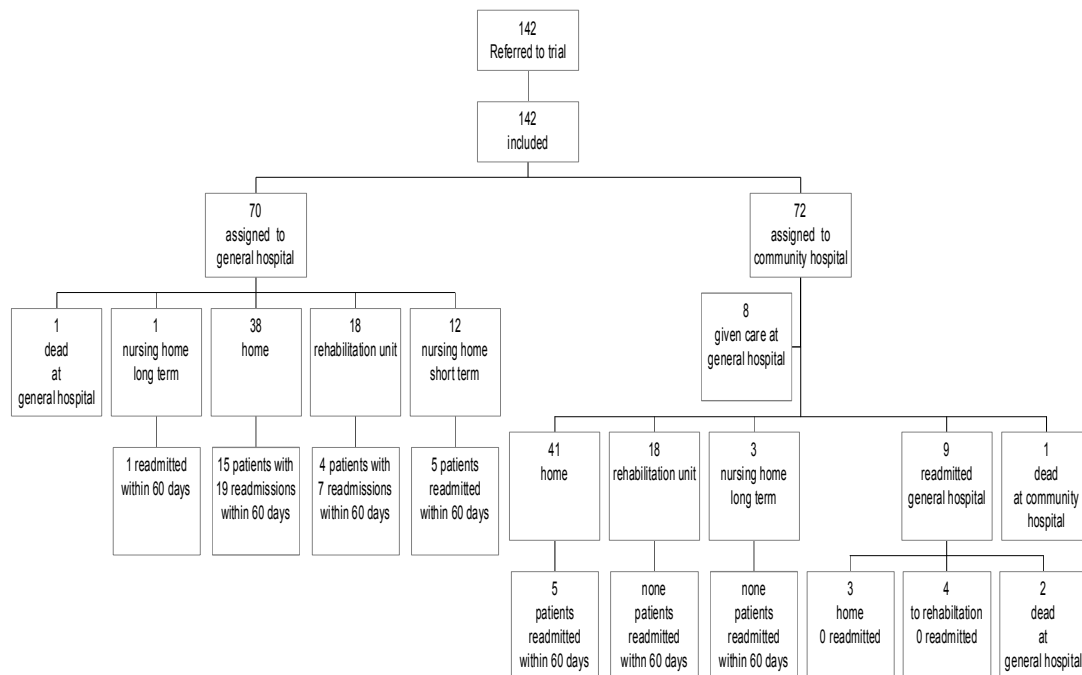
Eventually, there were four inclusion criteria for eligible participants developed; 1) patients aged 60 years or more admitted to the general hospital due to an acute illness or an acute exacerbation of a known chronic disease, 2) will probably be in need of inpatient care for more than three or four days, 3) admitted from their own homes and 4) expected to return home when inpatient care was finished. Exclusion criteria were severe dementia or psychiatric disorders needing specialised care 24 hours a day.

The number of deaths was monitored continuously throughout the trial, as there was a pre-trial decision that an increase in the number of deaths at the community hospital would terminate the study.

All patients randomised for care at the community hospital were transferred from the general hospital within 24 hours of inclusion to the study and immediately after randomisation. Only sixty-four patients were transferred from the general hospital to intermediate care (intermediate care group), as eight of the patients randomised for intervention were never transferred due to acute and severe deterioration of their medical conditions after inclusion. In the intention-to-treat analyses they were included in the intervention group, otherwise, in the treatment-analyses they were dealt with as a separate group.

There were no dropouts, except for deaths, during the trial and for all patients all data was collected from the first day at the general hospital and until the end of the trial or at the time of death.

Figure 1. Study design study II



Patient Characteristics

At randomisation (index day), the patients randomised to intermediate care or to general hospital care were comparable in respect to number of days of care before randomisation, mean and median age, diagnosis, gender, ADL and marital status.

The general hospital group had the best mean ADL score, 2.05, and the intervention group somewhat worse with a mean score at 2.24, a non-significant difference (p=0.27). The eight patients not transferred to intermediate care, due to their medical condition, had a more severe loss in ADL, mean score 2.60.

4.2.1 Study design

In this trial the short term and long term effects of intermediate care intervention at a community hospital were evaluated by a prospective randomised controlled design (129) as illustrated in **Figure 1**. When an eligible patient was identified and accepted for inclusion, a blinded randomisation was performed by the Clinical Research Department at the Faculty of Medicine using random number tables in blocks to ensure balanced groups.

All data was collected by the author, (HG), according to prepared schemes, from patients' electronic and paper-based journals at the city hospital and from patients' health records kept by the local care services at primary level in the city of Trondheim. Number of days in institution, readmissions and cause-specific deaths were monitored through the patient administrative systems, independent of treatment groups.

4.2.1.1 Approvals and Clinical Trial Registration

The Regional Committee for Medical Research Ethics for Central Norway approved the study, the patient information and the consent schemes. The study was granted license by the Norwegian Data Inspectorate to process personal health data. Each participating patient signed a written informed consent form at the general hospital prior to inclusion in the study.

The trial was registered at ClinicalTrials.gov with registration number NCT00235404 (130).

4.2.2 Intervention

4.2.2.1 Organisation of the intermediate department – the community hospital

Twenty beds at Søbstad Nursing Home were re-assigned in late 2002 to be a community hospital providing intermediate level care. This change required an increased number of trained nurses from 12.5 to 16.7 full-time positions per week and doctors' hours, performed by three general practitioners, from 7 hours to 37.5 hours per week. All employees underwent a training programme provided by the general hospital. The department was also upgraded with laboratory facilities including intravenous pumps, equipment for continuously monitoring of blood oxygen saturation, laboratory equipment to measure infection variables, haemoglobin and blood glucose. Other blood tests could be delivered daily to the main laboratory at the general hospital with results provided within the same working day.

The city general hospital in Trondheim, St.Olavs University Hospital, is both a general hospital for the municipality of Trondheim and a university hospital for the three counties in Mid-Norway. It was the hospitals' function as a general hospital that was included in this trial.

4.2.2.2 Organisation of care at the community hospital

Before randomisation there was no difference in the level of care given to all the patients at the general hospital.

The experimental intervention was based on individualised intermediate care including evaluation and treatment ("care" and "cure") of each patient's diseases (48). However, the main focus was to improve the patients' ability to manage daily activities when they returned home.

On admission to the community hospital the physicians performed a medical examination of the patient and a careful evaluation of any available health records from the admitting general practitioner, the general hospital physicians and the community home care services. The communication with the patient and his family, focusing on physical and mental challenges, was also essential in order to understand the patients' general needs and the level of care required. In most cases there were meetings with the patients and their relatives. The patient, the families and the professionals working together decided on suitable aims for the stay in hospital.

However, the main focus, from the first day at the community hospital, was to monitor and improve the patients' ability to manage daily life activities (ADL). This required close cooperation between the patients' families, home care, occupational therapists, physiotherapists and general practitioners. Two nurses specially trained to use a national registration system, Gerix, monitored ADL scores on 72 factors, with scores from one to four given for each factor, whilst patients were at the community hospital and at the city hospital departments (131-133). With an average ADL score of one the patient functions perfectly in all areas, whereas an average score of four indicates a need of extensive help and care in all aspects of daily living.

It was the nursing staff, with full patient involvement, that determined the patients' most pressing difficulties with daily activities, both physiological and mental problems. Together they decided what needed to be done so that the patient would be able to manage independently on returning home. Prior to discharge from the community hospital a multidisciplinary planning meeting took place for those patients who were in need of special arrangements or extensive follow-up.

An important task was to write discharge letters to the family physician describing the patients' medical history, actual situation and to elucidate areas that would require follow up by the physician.

Care at the different departments at the general hospital and communication with primary health care followed normal routines.

4.2.3 Patients' functional status (ADL)

There is no consensus or consistency on how to measure patients' functional status before a disease or injury, during a disease, or as sequels after a disease, due to age or other mental or physical handicaps. This complicates comparisons between studies and the interpretation of a large proportion of the studies. However, there are several studies using person level data on functional status (e.g. ADL) as measures for patient outcome and service evaluation (2,134-136).

There are several instruments for monitoring activities of daily living (ADL) as a measure of need for care. Prior to this study we discussed several instruments and decided to use the instrument that has been used in the municipality of Trondheim since 1993. It is well known by the professionals, used on an everyday basis not only when new patients are allocated community health services, but also when there are changes in the patients' physical or mental status. Two nurses in each municipal unit are certified to carry out assessments of the patients and to register the results in the electronic patient record system on each patient (Gerica).

Gerix (131-133) is a system for the registration of patient data for patients who have been allocated care services at primary care level. Ministry of Social Affairs (SHD), Ministry of Local Government and regional Development (KRD), The Norwegian Association of Local and Regional Authorities (KS) and Statistics of Norway (SSB) developed the system in the beginning of the 1990s.

One of the main objectives with Gerix was to identify each patient's degree of need for care by measuring 17 different fields for ADL (132).

The 17 different factors are weighted and a weighted average ADL-score/level, level of care, is calculated (“pleietyngde”):

- 1.0- <1.5: Low care level
- 1.5- <2.0: Low-moderate care level.
- 2.0-<2.5: Moderate care level.
- 2.5-<3.0: Intermediate care level.
- 3.0-<3.5: High care level.
- 3.5-4.0: Very high care level.

The Gerix system also monitors social status, patients’ location (home, institution, sheltered housing for elderly etc), mental status, age, vision and hearing.

Ten of the fields measure ability to cope with daily activities, and the seven others measure cognitive and emotional fields.

The fields are: Indoor mobility, outdoor mobility, personal hygiene, ability to dress/undress, toilet-visits, eating, shopping, cleaning, medical functionality, understanding of patient’s own situation, ability to interact socially, orientation skills, ability to show initiative, ability to take responsibility for his own day-to-day life, communicative skills.

Each field is measured on a scale with four values:

Value 1: No problems/ no reduction - Can perform a task without any help.

Value 2: Some problems/reduction – Can perform a task with some adaptations (e.g. technical equipment)

Value 3: Many problems/reduction – Can perform the task partly by himself, needs some help and/or motivation.

Value 4: Severe problems/reduction – Totally dependent on help from others.

The municipality of Trondheim has been using Gerix as a registration system for all community care patients since 1993. Patients’ ADL status are monitored continuously and the Gerix scores are changed when changes in the patients ADL status warrants it. Since 2002 the level of care requirement has been used in budgeting all home care services.

One problem with Gerix, as with many other measuring instruments, is the systems insensitivity to small and sudden changes in function status. However, Gerix is well adapted

to the community health system, and has been used for more than ten years in Trondheim and gives a fairly accurate description of the patient's overall functional status (133).

Gerix has now been further developed into a new national system, IPLOS, (137) and all Gerix-data has, since late 2006, been replaced by IPLOS scores.

4.2.4 Assessments of outcome

There are several national and international studies on inappropriate admissions to hospitals and alternatives to general hospital care (78-94). Most of the studies have focused on patients' outcomes from a clinicians' point of view; e.g. morbidity, mortality, days in hospital, inappropriate admissions to general hospitals as judged by hospital physicians and most have used differing instruments for measuring quality of life and ADL.

Choosing outcomes that allow comparisons between studies and result interpretation can make trial methodology very difficult. The main task is to choose instruments in accordance with the research question and that is consistent with the aims of the intervention to be evaluated.

The present trial used outcomes available in the health records covering the patients' and clinicians' perspective as well as the managers need of information to plan and organise health services. As a consequence, all of the collected data about the patients is administrative and health information normally registered and recorded in the various systems. There were no new procedures or registration schemes other than the inclusion and randomisation procedures and the intervention itself at the community hospital, Søbstad.

4.2.4.1 Primary outcomes

Primary outcomes, that were assessed at the time of discharge from initial inpatient care, after 180 and 360 days respectively after primary discharge from general and community hospitals, were:

- Morbidity assessed as
 - o Number of readmissions to the general hospital for the same diagnosis within 60 days of primary discharge from general or community hospitals after randomisation

- Number of deaths (mortality)
- Need for home care
- Need for long-term nursing home care
- Number of general hospital admissions for
 - Same disease
 - Other diseases
- Costs of
 - Prolonged general hospital care after randomisation
 - Readmissions to the general hospital
 - Care at the community hospital
 - Rehabilitation
 - Long-term-nursing home care
 - Home care
 - General hospital admissions for the same disease
 - General hospital admissions for other diseases

All of this data was accessible in patients' health records at St. Olavs University Hospital, the health records in the municipality of Trondheim and in the accounts for both the general hospital and the municipality for 2004 and 2005.

All information on care within the municipality was collected from the municipal electronic health records and the municipal electronic administrative system. There was no missing data in the patient records in the municipality.

The study was originally designed to use only paper based health records at the general hospital. However, 15 health records (paper based) were not available at the general hospital. As a consequence all the information that was needed, for every patient, was also collected from the electronic health records (Doculive) used by the general hospital. There were also some misclassifications in the patient administrative system at the general hospital. Some general hospital readmissions were classified with the wrong diagnosis, and others were classified as acute care readmissions when they should have been classified as elective admissions. These misclassifications were corrected by the use of information from the electronic health records. As a consequence, all assessments were done based on unabridged information for all of the patients.

All data was collected by one of the authors, (HG), according to a prepared protocol from patients' medical records at the hospital and from primary health services. He only had access

to information about the health care that had been provided at the community hospital at the time of data collection and had no knowledge of which group the patients belonged to.

4.2.4.2 Secondary outcomes

Secondary outcomes, assessed after 180 and 360 days respectively after primary discharge from general hospital or the community hospital were:

- Mortality as number of deaths and days before death (recorded continuously during the whole trial)
- Number of days at general and community hospital, rehabilitation departments and nursing homes for:
 - o Primary care at the general hospital and the community hospital
 - o Readmissions to the general hospital
 - o General hospital admissions for the same and other diseases
- Number of days before being admitted to a long-term nursing home

Also all of this data was accessible in patients' health records at St. Olavs University Hospital, in the health records in the Municipality of Trondheim as well as in accounts at the hospital and in the municipality for 2004 and 2005.

All assessments on secondary outcomes were done based on unabridged information on all patients.

4.2.5 Assessments of health services costs

Whilst care at a community hospital is less expensive than at an acute care general hospital, total health care costs could still increase, either because of an increase in general hospital readmission rates or due to increase in the use of other health care resources. Nurse led intermediate care in Britain led to longer general hospital stays (103-105), and was significantly more expensive due to the increase in the number of inpatient days (104). Thus, in order to compare health care models, it is necessary to compare all care costs over a given period of time. In the present study the patients were followed over a period of six and 12 months to get substantial values for long-term effects.

It was challenging to get precise information about care costs for each patient at St. Olavs University Hospital, as the hospital does not use per capita bookkeeping. We chose to use estimates of average costs per service, a so-called “gross-costing” (138-140). However, the managers at St. Olavs University Hospital do have accurate figures for each hospital department and for the cost of some specialised procedures for example X-rays, dialysis, x-rays, pacemakers, intensive care, surgery and cytostatics.

Patients who had been admitted electively were not included into the present study. Typically all intensive and specialised procedures were used in the acute phase of the first days at an acute care hospital. Consequently, as most of the patients received acute and intensive care there is a probability that the cost of care at the general hospital has been underestimated.

4.2.5.1. Capital, research and education costs

Capital costs have not routinely been included in general hospital and community accounts in Norway. But the municipality of Trondheim does have accounts showing precise capital costs for all departments in the municipality for the last three years. This is not the case at St. Olavs University Hospital. As a consequence capital costs are not included in the analysis due to the imprecise figures from St. Olavs University Hospital. This represents a weakness in the overall costing, but will most likely bias the figures in favour of the general hospital group.

Research and education are integrated parts of the activities of a university hospital and may partly contribute to higher costs than at general hospitals. It is not possible to estimate these costs separately. However, in the present study we wanted to compare care costs between a community hospital and care at St. Olavs University Hospital given through its role as a general hospital. Research and education costs are, in our opinion, an inherent part of the true cost of care.

4.2.5.2 Definition of costs

A cost minimisation analysis was performed where costs were looked at from a health service perspective. Macro costs are compared from the time of randomisation until six and 12 months after discharge from care at the general hospital or at the community hospital. The costs of different types of health services were calculated as average care costs and home care services costs per day, excluding capital costs, as defined by managers at St. Olavs University Hospital and in the municipality of Trondheim. Figures were taken from the accounts for

2004 and 2005. This solution was used instead of a detailed micro costing per service (**Table 2**).

**Table 2. Calculated health care costs for cost analyses¹.
Trondheim 2003-2005.**

General hospital ²	NOK 4400
Community hospital ²	NOK 1370
Rehabilitation departments ²	NOK 950
Long-term nursing home ²	NOK 835
Home care (nurse) ³	NOK 350
Home care (practical help) ³	NOK 250
<u>General hospital readmissions²</u>	<u>NOK 4400</u>

¹ Costs calculated from accountancies for year 2004 and 2005. 8 NOK = 1 EUR

² Per 24 hours

³ Per hour

Average costs include medical staff, nursing staff, materials, nutrition, inpatient medication, laboratory costs, laundry, cleaning and rehabilitation training within institutions. For home care transportation costs for the nurses are included. Managers at the general hospital calculated costs (exclusive costs for dialysis, x-rays, pacemakers, intensive care, surgery and cytostatics) for the departments at the general hospital involved in the study. General hospital readmission costs are also based on average costs per day.

Outpatient medication, travel expenses between institutions and home and expenses for visits by the general practitioners are not included as the present study was a comparison on community health care as an alternative to general hospital care.

Managers in the municipality of Trondheim calculated average costs per day at the community hospital and rehabilitation departments except for home-care services where costs are per hour of care per patient. Each department, i.e. nursing homes, home care units, rehabilitation departments, and has separate account books in Trondheim.

The costs of the following four groups were measured: 1. Care costs at the general hospital or at the community hospital. 2. Readmission costs at the general hospital. 3. Community care costs after discharge from the general hospital or the community hospital including costs related to rehabilitation, community home care services and long-term nursing homes. 4. Total care costs from index day and until twelve months of follow-up after discharge from the hospitals.

4.2.5.3 Censoring of data

Average costs can lead to serious biases in the presence of censoring (141-143). Ignoring censored data can lead to an underestimation of mean total costs (142).

One possible censoring method is to use a weighted cost method with known histories. For the dead patients, with this method, estimates are done of average days of care for each group and then potential care costs are calculated as if they had been alive for the whole period of follow-up.

In the present study there were no dropouts during the observation period except for the deaths. All data and costs for each patient were recorded individually from the time of randomisation, index day, and until 180 and 360 days of follow-up after discharge from either community hospital or general hospital or until death. Average care costs were estimated per patient per day and per service according to where the patient actually received care (141-142).

4.2.6 Patient consumer survey 2004.

The municipality of Trondheim carried out a survey amongst all patients at the 27 nursing homes in Trondheim in 2004 (N=1250). A modified questionnaire was given to patients admitted to the community hospital at Søbstad Teaching Nursing Home in November and December 2004. The same questionnaire was also used at a nursing home in the municipality of Bærum (Henie Onstad Nursing Home, HOBR) where SINTEF Health Research did a similar survey (144). The results from Søbstad (n=39) and HOBR (n=25) were presented in a report by SINTEF in 2005.

The results of the survey in Trondheim

Fifty percent of the respondents at Søbstad were above 80 years of age, and 72 % were females (144). Only eleven (28.2 %) did know whom their primary care contact was at the community hospital at Søbstad. 78 % could follow normal sleeping- and eating-rhythms, and about 90 % was satisfied with the help they received with personal hygiene (toilet visits, baths/showers). Asked if the food was appetising, 80 % answered yes, and 37 of the patients felt that they got enough food.

100 % said they were treated with respect and politeness, and 94 % said they got enough attention from the staff, and that they got assistance when they needed it. 90% of the patients were also confident of getting medical help when they needed a physician. The patients were also asked if they got enough help to be well groomed and more than 90 % (37 patients) answered yes, only one no. However, 51.2 % meant that the information they got at the general hospital about the community hospital was unsatisfactory. We concluded that the patients at the community hospital, Søbstad were satisfied with the care they received, and were particularly contented with the medical care, hygiene and help and support with daily activities. However, the information given about the community hospital at the general hospital could have been much better.

4.2.7 Statistical analyses study II

Statistical software programs used were SPSS 14.0 and 15.0 (SPSS Inc., Chicago, IL, USA) and Excel 2003 for Windows. Statistical significance was set at $p=0.05$.

4.2.7.1 Sample size estimation

The sample size was estimated to detect a difference of 25 per cent in the number of general hospital readmissions, as an assessment of morbidity, between the groups with alpha 0.05 and power of 0.80. To achieve this we needed a total of 130 patients, 65 patients in each group (145).

4.2.7.2 Statistical analyses

4.2.7.2.1. Statistics of the baseline data

The distribution of continuous variables was tested by comparing means and medians and by normality plots; age, gender, diagnosis, marital status and ADL-scores. Group homogeneity was analysed with chi square test (χ^2 test).

4.2.7.2.2 Treatment and intention to treat analyses

All comparisons between the intervention and control group were analysed both as intention-to-treat analyses and as treatment analyses, dependent on where the patient received the care.

Survival curves were estimated by Kaplan-Meier. The distribution of continuous variables was tested by comparing means and medians and by normality plots. Differences in number of patients with readmissions, need for home care or nursing home care between groups were tested by chi square tests, and differences in the mean number of days with inpatient care were tested both by paired t-test and by Wilcoxon signed rank test. Differences in readmissions and need for home care or nursing home care were also tested in logistic models adjusted for gender, age, ADL score and diagnosis. The fit of the logistic models was tested with Hosmer and Lemeshows goodness of fit test.

The number of days in institutions was compared between groups using covariance analyses with age, gender, ADL scores and diagnoses as covariates.

4.2.7.2.3 Cost analyses

Differences in mean costs were analysed by independent sample T-test and adjustments in differences in costs were analysed by ANOVA covariance analyses. As sensitivity analysis we calculated how much the community hospital costs would have to be increased and the general hospital costs decreased to render the observed differences insignificant.

4.2.7.2.4 Paper II, III and IV

All comparisons between the intervention and control group were analysed both as intention-to-treat analyses and as treatment analyses, dependent on where the patient received the care. All data was presented and analysed according to the CONSORT checklist. The comparisons between the intervention and control group were analysed as intention-to-treat analyses according to the CONSORT instructions.

Survival curves were estimated by using Kaplan-Meier. The distribution of continuous variables was tested by comparing means and medians and by normality plots. Differences in number of patients with readmissions and need for home care or nursing home care between groups were tested by chi square tests, and differences in mean number of days of inpatient care were tested both by paired t-test and by Wilcoxon signed rank test. Differences in readmissions and need for home care or nursing home care were also analysed in logistic models adjusted for gender, age, ADL score and diagnosis. Hosmer and Lemeshows goodness of fit test tested the fit of the logistic models. The number of days in institutions was

compared between groups using covariance analyses with age, gender, ADL scores and diagnoses as covariates.

Differences in mean costs were analysed by independent sample T-test and adjustments in differences in costs were analysed by ANOVA covariance analyses.

The level of significance was set to $p = 0.05$.

4.3. Funding

4.3.1. Study I – the quality of communication between hospital and general practitioners.

The study was supported with grants from The Norwegian Association of Local and Regional Authorities (KS).

4.3.2. Study II – Intermediate care.

This study was supported with grants from Central Norway Regional Health Authority. Also the municipality of Trondheim and St. Olavs University Hospital supported the trial by allocating health, economic and secretarial personnel at the general hospital and in the community to take part in all of the procedures in line with trial protocols, recruitment, randomisation of patients as well as collecting all the necessary data from patient health records and accounts.

5.0 Results

5.1 Hypothesis 1: Referral and discharge letters between physicians do contain sufficient information to secure optimal patient treatment when transferring duties and obligations from one responsible person or medical team to another.

5.1.1 Review of paper I: The quality of communication about older patients between hospital physicians and general practitioners: a panel study assessment.

Results: While information in the referral letters on medical history, signs and medications was assessed to be of high quality in 39 %, in 56 % in 39 %, respectively, the corresponding information assessed to be of high quality in the discharge letter was for medical history 92 %, signs 55 % and medications 82 %. Only half of the discharge letters had satisfactory

information on ADL. One of four of the discharge letters did not describe who was responsible for the follow-up.

Hypothesis 1 is false, because:

- Both referral and discharge letters did lack vital medical information, and referral letters to such an extent that it might represent a health hazard for the patients.
- In addition: There was poor consensus between health professionals at primary and secondary level as to the definition of good quality as far as referral and discharge letters are concerned.

5.2 Hypothesis 2: The number of unnecessary referrals of elderly patients to the general hospital is small, and there are patients where care could have been performed at primary level instead of at a general hospital

5.2.1 Review of paper I: The quality of communication about older patients between hospital physicians and general practitioners: a panel study assessment.

Results: Some two-thirds of the patients were assessed to have a high level of health benefits from the current general hospital stay. One of six patients could have been treated without a general hospital admission. The specialists assessed that 77 % of the patients had a high level of benefit from the general hospital stay; however the general practitioners denoted only 59 %.

Hypothesis 2 is false, because:

- Only some two-thirds of the patients were assessed to have a high level of benefits from the current admission to the general hospital.
- One of six patients could have been treated without admission to the general hospital.
- At orthopaedic and pulmonary departments there were patients that could have been treated at a community hospital instead of at the general hospital.
- In addition: There was low consensus between health professionals at primary and secondary level as to of the definition of a high level of benefit from general hospital care.

5.3 Hypothesis 3: Intermediate care at an upgraded nursing home (community hospital) reduces morbidity (assessed as number of readmissions to general hospital, need for home

care and need for long-term nursing home care) without increasing mortality, the number of days in institutions, and at a lower cost.

5.3.1 Review of paper II: Intermediate care at a community hospital as an alternative to general hospital care for elderly patients: a randomised controlled trial.

Results: In the intervention group 14 patients (19.4 %) were readmitted compared to 25 patients (35.7 %) in the general hospital group ($p=0.03$). After 26 weeks 18 (25.0 %) patients in the intervention group were independent of community care compared to seven (10.0 %) in the general hospital group ($p=0.02$). There was a non-significant reduction in the number of deaths in the intervention group and a non-significant difference in number of days with inpatient care. The number of patients admitted to long-term nursing homes from the intervention group was insignificantly higher than in the general hospital group.

5.3.2 Review of paper III: The cost of care at intermediate level in a nursing home for patients over the age of 60 compared with costs incurred in a general hospital - 12 month follow-up of a randomised controlled study in Trondheim.

Results: Mean total health services costs per patient in the intervention group for the first six months were EUR 9829 (95 % CI 7396-12262) compared to EUR 14071 (95 % CI 10717-17424) in the general hospital group. The mean difference in costs was EUR 4242 (95 % CI 152-8331) ($p=0.003$), and mean difference in cost per day at risk per patient was EUR 37 (95 % CI 1-71) ($p=0.003$).

Average total health services costs per patient per observed day were EUR 76 (95 % CI 56-95) for the intervention group and EUR 100 (95 % CI 80-120) for the general hospital group ($p=0.03$).

5.3.3 Review of paper IV: Intermediate care at a community hospital for elderly patients: 12 months follow-up of a randomised controlled trial.

Results: Thirty-five patients, 13 (18.1 %) of all patients included in the intervention group and 22 (31.4 %) in the general hospital group, died within 12 months ($p=0.03$). Patients in the intervention group were observed during a longer period of time than in the general hospital group; 335.7 (95 % CI 312.0-359.4) versus 292.8 (95 % CI 264.1-321.5) days ($p=0.01$).

Hypothesis 3 is partially true, because:

- Intermediate care significantly decreased the number of days patients were readmitted to general hospital and also increased the number of patients who were independent of community care after 26 weeks of follow-up significantly.
- The total costs of public health care services were significantly lower for patients provided intermediate care at a community hospital compared to traditional prolonged general hospital care after six months of follow-up.
- Care at intermediate level is cost effective from a health service perspective after 12 months of follow-up.
- And intermediate level care gives better patient outcome, assessed as independency of community care, as more patients have better functional status and significantly fewer patients are dead after 12 months follow-up.

6.0 General discussion

Methodological considerations – strengths and constraints

Validity must be questioned for both studies. (123,145). Firstly, have systematic errors (bias) been minimised (internal validity)? Secondly, do the results provide correct bases for generalisations to other circumstances (external validity)?

6.1 Study I – the panel study

6.1.1 General discussion study I

Study I was planned as an explorative study to highlight the quality of referral and discharge letters and also to test the hypothesis that there were a small number of patients that could have been treated without being admitted to a general hospital. It was also used to get information about the local situation to facilitate planning of an intervention study in Trondheim; study II.

In study I several approaches were discussed. A major challenge was the heterogeneity of the patient population; age, gender, diagnosis, ADL-scores, social networks, medication and ultimately the high numbers of professionals and teams involved, both at primary and secondary levels.

It could have been possible to establish control groups to compare differences in referral letters from general practitioners, emergency care personal and specialists at the general hospital, or to see if there were differences in referrals to different departments at the general hospital. In the same manner it could have been possible to compare discharge letters from different departments at the hospital, and to some extent there is a comparison in study I of the quality of discharge letters from the orthopaedic, pulmonary and cardiologic departments. Theoretically, we could have established patient control groups where the admitted patients were e.g. randomised to inpatient or outpatient care.

It could also been possible to perform a randomised controlled study where letters concerning the patients were randomised to assessment. This approach would have minimised the possibilities for the physicians to identify which of the letters were to be assessed.

As the main intension was to get a better overview in a field where there was apparently an overload of both contradictory and insufficient information, it was decided that the most realistic approach was to do a pilot study, with limited time and resources, using consensus methods. This study used a combination of nominal and Delphi techniques. These methods have been used in other studies on inappropriate health care and in definitions of clinical guidelines (36-38,118). In these panels clinical experts (in their respective fields) use their professional knowledge and insight to judge the quality and appropriateness of the particular field on the agenda.

The reasons for choosing these consensus methods were (36-38):

- There are no common care programs that define the content of appropriate care for older patients at hospitals or in community care.
- There are no particular professional standards that define what kind of information should be passed from one professional or team to another when handing over responsibility, to enable delivery of appropriate health care.
- There are no standards that define what level of care is suitable for each patient.
- There are no other clearly defined methods to evaluate the quality of referral and discharge letters.
- Consensus methods are aids to synthesise information in a wider range than common statistical methods for decision-making both in clinical practice and in health service development.
- The ability of a group of experts with no prior history of communication with one another to effectively discuss a problem as a group.
- Participants can respond at their convenience.
- The anonymity of participants provides them with the opportunity to freely express opinions and positions.

6.1.2. The composition of the expert panels

The credibility of a consensus technique depends heavily upon the panel composition. Some studies have shown that panels with different stakeholders were rating the same statements differently (124,146-147). In all likelihood each profession will have difficulty formulating a definition of quality or a gold standard that will be relevant for other professions. Every professional will focus on their own needs and standards according to their particular interests and the type of care they provide. A cardiologist and orthopaedist will usually have quite different interpretations. Another interesting trend is a tendency to over-estimate the effects of one's own specialty (148), and a single disciplinary panel is more likely to rate a particular indication as appropriate than a multidisciplinary panel (149-150).

Most older patients have several diseases, use several medicines and often have low ADL-scores, and as a consequence there is a complicated, multimorbidity frame in most cases where different settings have to be considered. With this broad perspective in mind, it would

be difficult for only one profession or one group of specialists to judge if the content of the written communication is sufficient or what form appropriate care should have (33, 147-150).

One of the key issues, when using expert panels, is the recruitment of competent specialists in accordance with the fields that are to be elucidated. The panel has to reflect the constituency of the stakeholders it is intended to represent. As a consequence, in study I the professionals, in the two expert panels, were recruited from both primary and secondary level, all with a high competency on the health problems of the older patient. They were experienced specialists (internist and geriatrician), general practitioners and community health nurses. All panellists were certified specialists in their respective fields.

6.1.3. Reliability of the expert panels

Several national and international studies have shown the reliability of expert panels through consensus methods (33-34). However, the panels should be multidisciplinary (147-148). The stability of the response characteristics of a Delphi panel with similarly trained panellists, with a general understanding of the field of interest, has proved to be an effective and reliable way to adjudicate and an effective tool to promote discussions (148-149).

6.1.4 Validity of expert panel assessments

A distinction has to be made between internal and external validity (147-148).

Several studies have shown that expert panels composed of appropriate and multidisciplinary experts are able to make valid judgments (118,147-148).

6.1.5 Agreements and disagreements about health assessments, on the quality of physicians' letters and on the benefit of health care

Indicators of quality in health care have been an important topic in most countries. The various systems have employed methods varying from inspection by external appraisers at one extreme to discussions between colleagues at the other (151). Professional consensus is likely to be relevant, but discussions may be based on subjective opinion as in peer-reviews (medical audit) (151). However, appraisal or audit of a standard is explicit and objective if the standards are relevant and valid (151). Despite a widespread acceptance of using review tools

designed to assess the appropriateness of care in acute general care hospitals, studies have shown a low level of validity when reviewed retrospectively by trained reviewers (150-152).

A major challenge, when defining indicators of the makeup of appropriate care, is to increase measurability and objectivity while retaining validity and relevance. However; there are no indicators in Norway on appropriate care, when a patient is classified ready for discharge from general hospitals or when the patient needs general hospital care (excluding requisite acute care as defined by law) (153). As a consequence the two expert panels had to rely on their own clinical experiences and judgments.

To avoid possible bias by letting only one panel assessing all the letters, two panels were recruited.

Another consequence of the study's design was that the predictions also reflected the inter-panel variation of the assessments; including scrutiny of the agreement between the panels. The agreement between the matching panels was satisfactory in the fields where there exist common professional agreements on the definition of sufficient information (medical history, medication) (**Table 3**). However, in fields where information about ADL and social network was a necessity when assessing the level of need for care at home or in nursing homes, the degree of agreement between the panels and the panellists was lower.

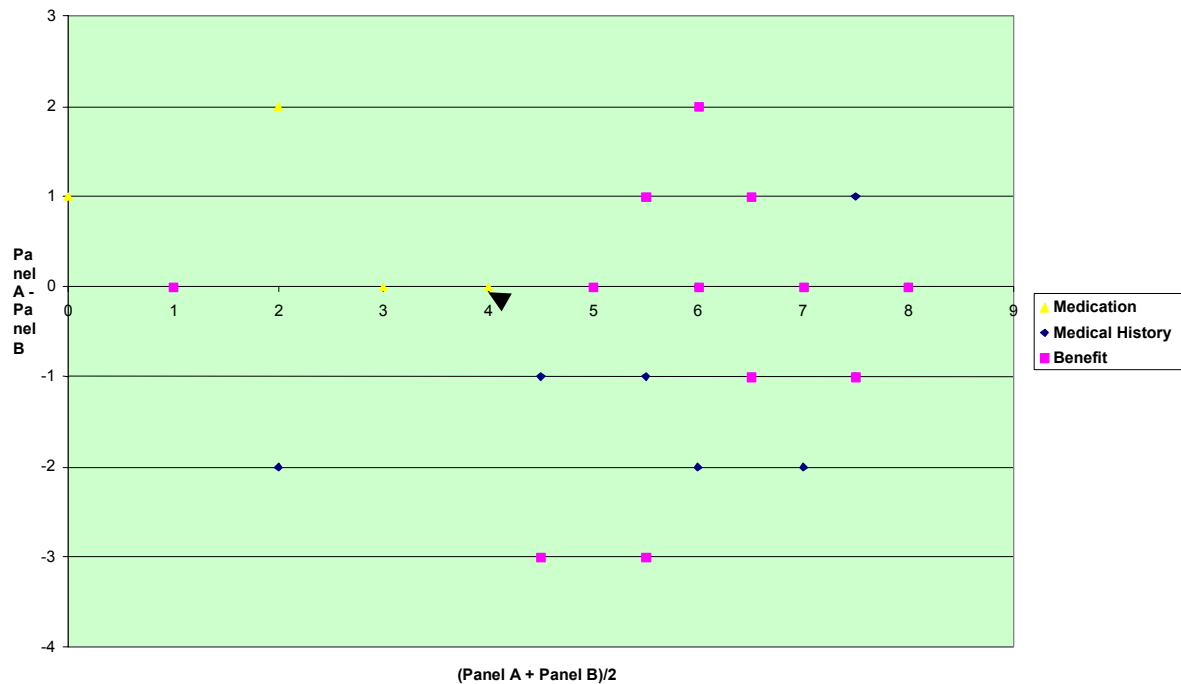
Table 3. Assessments of consensus between panels A and B on the quality of varying elements in information in the referral letters (n=25).

	Observed agreement	Proportional agreement			κ (95 % CI)
		Low	Intermediate	High	
		Quality of			
Medical history	0.96	1.00	0.50	0.96	0.78 (0.37-1.00)
Signs	0.52	0.09	0.00	0.52	0.10 (0.00-0.47)
Medication	1.00	1.00	1.00	1.00	1.00 (1.00-1.00)
ADL	0.58	0.25	0.18	0.58	0.25 (0.00-0.61)
Social network	0.44	0.67	0.33	0.13	0.14 (0.00-0.44)
Need of care	0.72	0.75	0.15	0.17	0.51 (0.20-0.82)
Benefit	0.79	0.00	0.40	0.77	0.35 (0.00-0.86)

Also the Bland-Altman diagram (145) showed small variations between the panels (**Figure 2**). On the topic of medication there were no differences between the panels for 21 persons, a difference of one in three cases and two in one case. Regarding the benefits of general hospital care, which was the element where disagreement between the panels was greatest,

there were eleven cases with zero and one in difference, and one with two and two with three in difference. Disagreements were defined to exist between the panels when there were a low or medium score on the VAS-scale. Panel (B) had the highest score in nearly all 25 cases.

Figure 2. The difference between the mean score of the quality of information about medication, medical history and the benefit of hospital stay from Panel A and Panel B according to the assessed quality.



There were variations in the assessments of some factors especially on the need for care, ADL and social network, between the panellists. These variations might constitute a major problem when physicians only use clinical judgments when they make decisions about admissions to and discharges from general hospital care as well as when deciding which patients need long-term nursing-home care. This is also reflected in the results, as consensus as to the benefit of hospitalisation was fair between the panels (**Table 3**) and varied from poor to good, within the panels and the professions (**Table 4**). There was a much higher degree of consensus amongst the specialists ($\kappa=0.64$) than the other professions. Disagreement as to the benefit of treatment between the specialist and the general practitioner in one of the panels was particularly large ($\kappa= 0.04$).

Table 4. Assessment of the health benefits of hospitalisation by profession in both panels, and by both panels (N=100).

	Low (95 % CI)	Intermediate	High (95 % CI)	Mean score (95 % CI)
Internists	8 (4-15)	15	77 (68-85)	6.39 (6.04-6.73)
General Practitioners	15 (9-24)	26	59 (49-69)	5.74 (5.35-6.13)
Nurses	6 (2-13)	23	71 (61-80)	6.28 (5.97-6.58)
Both panels	8 (4-15)	22	70 (60-79)	6.27 (5.96-6.58)

6.1.6 Possible consequences on the health professionals' uncertainties in predicting patient outcome

The lack of ability of professionals to be able to predict and to judge which patients would benefit from a general hospital admission as well as their difficulty evaluating the patients' need for care is worrying. This makes the appropriateness of care decisions questionable; the following questions can and should be posed:

- General practitioners are not providing a proper gatekeeper function
- Patients are not provided with proper care at the general hospital
- Patients are not provided with proper care in the community
- A number of patients are unnecessarily admitted to general hospital care
- A number of patients are unnecessarily admitted to long-term care in nursing homes

6.2 Study II – the randomised controlled trial

6.2.1. Random errors

Random errors lead to loss of precision; increasing the sample size can ameliorate this. The sample size was based on power estimates before the study started. The pre-planned sample size was 130 patients, 65 in each group. The sample size was estimated to reveal a difference, estimated rate of success, of 25 per cent in the number of readmissions between the groups, with alpha 0.05 (significance level) and beta 0.20 (power 80 %) (145). When the inclusion period was finished, 142 patients were included. There were a limited number of patients within each group of diagnoses. However, the purpose of the study was not to compare the outcomes of different diagnosis groups.

6.2.2. Selection bias

Selection bias may occur if an exposed individual with an adverse outcome is more likely to be included. To minimise selection bias, the study was designed as a randomised controlled

trial. Participating departments at the general hospital and staff at the community hospital had no influence on the blinded randomising procedures which were performed at an independent research unit at the Medical Faculty; Unit for Applied Clinical Research.

However, many chronically ill older patients regularly move backwards and forwards between community and general hospital care with many short stays at general hospital each year. As a consequence there might be a selection of individuals who were in need of longer general hospital care. Even if the inclusion criteria were broader, the patients included to the study represented those who were found eligible for the randomised controlled trial, and not a random draw of all patients above 60 years of age admitted to the general hospital during the trial period.

A weakness of the study might be that there are no records of how many patients were asked to participate in the study but who refused to take part. There is neither any record of how many patients actually refused inclusion nor of how many eligible patients were not asked to participate in the study.

6.2.3. Confounders

In any study in which an outcome variable and an exposure variable are associated with a third variable, adjustment may be necessary, provided that the association between the outcome variable and the third variable (a possible confounder) is independent of the exposure and not merely an intermediate link in the causation (128). In order to avoid confounding factors distorting the apparent effects of intervention, adjustment were made. The distribution between the groups was accounted for by the blinded randomisation procedures. Still, there is sensibility for different diseases etc. The results were adjusted for age, gender, diagnosis and ADL.

Other confounders could be social network, matrimonial status, differences in services in different zones in the town, differences in collaboration with the general practitioner and the patients' mental capacities. Of these possible confounders only social network and matrimonial status were monitored, there were no differences between the patient groups in relation to these two factors. However, there are no indications that potential confounders could be differently distributed between the patient groups.

6.2.4. Endpoint assessments

The outcome measures were chosen in accordance with the aim of the establishment of the intermediate care department at Søbstad Teaching Nursing Home; i.e. to reduce (re)admissions to general hospital and the need of community care. In addition, outcomes were chosen that were consistent with those used in other multicomponent intervention trials (14,95-96,105,154).

6.2.5. External validity

This study was a single-centre trial carried out in a Norwegian community where there has been a close collaboration between the general hospital and community both at administrative and clinical levels for more than ten years. Community care in Trondheim is organised in a manner, and has such ready access to highly qualified professionals, that may make it unrepresentative for all other communities in Norway or in other countries. And it might be that the results were relevant only to older patients in need of prolonged inpatient care. However, the results were consistent with other trials in Trondheim (10,16) and in other countries (11-14). The study also had statistical power to reduce the risk of uneven distribution of confounders (128) and was performed as a randomised controlled trial. We believe that this trial has external validity, as the study population was unselected, except for the number of days in need of care.

6.3 Health benefits of care

6.3.1 Measuring health outcomes

Patients, the public, health care providers and politicians are all interested in evaluating care interventions, health care programmes and the benefits of health care (154-156). Evaluations are often difficult as the magnitude of changes and/or reasons for changes in health outcomes can be challenging to interpret. Most interventions yield small changes in the health of a population despite sometimes rather dramatic changes in health for some patients. If research has a narrow analysis e.g. on adverse events such as deaths and diseases, it may also be difficult to make an assumption that the benefits apparent from one perspective will extend to other perspectives (155).

Older people often suffer from conditions where diagnosis and care reduce the impact of a particular disease without necessarily extending life expectancy or quality of life. In some

circumstances, successful diagnoses and treatment may actually reduce life expectancy or overall life quality (157).

6.3.2 Measures of physiological functionality - ADL

In study II ADL status was tested using Gerix in accordance with the study protocol. There are four main reasons for using Gerix to measure ADL in study II:

- All health professionals (except physicians) in the municipality are quite familiar with Gerix, as it has been used as a registration tool since 1993.
- There are only two specially trained nurses in each municipality care unit certified to register and/or change the scores.
- When a patient's situation changes; socially or because of disease, the scores are continuously re-evaluated.
- Everybody receiving any kind of community health services has their Gerix scores recorded in the EHRs.

To evaluate the nurses' ability to measure ADL correctly a last year medical student was trained to use Gerix. He then tested 72 of the patients included in study II during a three month period in autumn 2004 (158). He assessed better ADL scores in most of the fields and found a significant difference between his assessments and those of the nurses for the indicators "dressing", "cooking", "shopping", "motivation", self sufficiency (cognitive)", "outdoor mobility", "insight of own situation", "indoor mobility" and "feeling safe". The differences were particularly large for the first five indicators. However, there were no differences between the assessment of the patients in the community hospital and the general hospital groups.

Instead of using Gerix, there are other commonly used tests that could have been used in study II:

Resident Assessment Instrument (RAI) was developed in the USA and is in use in 30 countries. In USA, Iceland and Japan RAI is the most common functionality measurement instrument in use (135,159).

RAI is a system of several measurement instruments for e.g. home (community) care, sheltered housing, residential and nursing homes, palliative care, mental health and persons with disabilities. It gives scores for medical data, physical, emotional, cognitive and social status and uses the same assessments items for key domains. The instrument is

internationally validated both for individual use and for planning of health services for groups of patients (2).

RAI is probably a rather more precise instrument and suitable both for individual and group planning. One major problem with RAI is that it is not widely used in Norway and is generally unknown to health professionals in Trondheim (160).

Barthel Index (BI) measures patient performances in ten activities of daily living (161). BI has an ordinal scale with a maximum score of 100, and has good validity and reliability. However, BI is insensitive to small changes in functional status (161).

When study II was planned, using the Barthel Index was considered as BI has been used earlier in studies performed in Trondheim (10,16,99). BI is probably most suitable for individual purposes and is not very (well) known in the community health care service. In addition, the use of BI requires especially trained health personnel familiar with BI to perform the tests.

6.3.3 Measures of mental status

Mental status was not recorded in study II as severe dementia and severe psychological disturbances were reasons for exclusion. Some of the patients admitted to the intermediate care department had a degree of dementia. The physicians at Søbstad tested their mental status and the results were recorded in their EHRs. However, the mental status of patients treated at the general hospital was probably not tested, as there were no scores recorded in the patient journals at the general hospital for any of the patients randomised to care at the general hospital.

6.3.4 Disease-specific outcomes

Study II was designed to use available data from health records and patient administrative systems at the general hospital and in the municipality as described on pages 31-32. Length of inpatient stay, readmissions to general hospital, mortality, ADL, usage of home care services and admissions to long-term nursing homes have been used in several studies assessing the appropriateness of admissions to general hospitals (43-45,79-81,83-86,95-96,162-163) and multicomponent interventions for older people (10,162-163).

Some studies have also used self-reported general health status, for example SF-36 is a validated and widely used questionnaire (164). However, when planning study II it was decided not to collect self-reported health data.

6.4 Costs

6.4.1. Cost assessments

Estimating the costs of care is difficult. Registration of exact costs for each patient at a general hospital or in community care is nearly impossible. Nurse and physician labour costs are the main expenditures at both care levels, and there are no good methods of registration that show how much time nurses and physicians use on each patient at general hospitals. However, the nursing homes and home care services in the municipality of Trondheim have reasonably precise reports on time used in the patient administrative system. The time that is used on each individual patient varies greatly from visit to visit and from patient to patient both in nursing homes and home care services (165). Also the use of medical procedures, medication, X-ray, intensive ward, surgery, cytostatics vary extremely. Obviously, resource utilization varies greatly and ought to be continuously registered for each patient in order to get exact figures for the cost of care for each patient.

In the community of Trondheim each unit is a separate financial entity and during the last few years accounts, with and without capital costs, have been established giving exact figures for average costs per patients at every nursing home and every home-care unit. The intermediate care department is also an independent financial unit and that has made it possible to calculate average costs per patient and per day of care.

Calculating costs at the general hospital is more complicated. The most expensive treatments at the general hospital are presumably surgery and intensive care. The cost analyses in study II, in all likelihood, underestimate the costs at the general hospital as many of the patients (all admissions were acute) in the trial required X-rays, intensive and coronary wards and several surgical procedures, some on several occasions.

Only costs for community and general hospital care were used, as the trial was a comparison between the cost effectiveness of public care models. This represents a weakness, as patients' costs for transportation, medication, consultations by family physicians, physiotherapists, as well as outpatient consultations for specialised examinations and private home care were not monitored. Patient diaries, where information on all contacts and care given was continuously recorded, could have been used to collect this information.

6.4.2. Censuring of costs

Patients were followed from the time of admission to the general hospital and until 360 days of follow-up or until time of death. There were no dropouts during the observation period except for deaths. Estimates of average costs might be biased due to dropouts and also due to censoring techniques (141-143). In our case censoring was due to deaths only. We therefore recorded all data and costs for each patient individually from the moment of randomisation and until 360 days of follow-up or until death and then estimated the average care costs per patient per day and the total costs depending on where the patient had actually received care.

6.4.2. Sensitivity analysis

As a sensitivity analysis we calculated how much the intermediate care costs would have to be increased and the general hospital costs decreased to render the observed differences insignificant.

We found that the costs per day at intermediate care had to be increased by 99 % or general hospital costs decreased by 57 % before the mean differences in average total treatment costs per day became insignificant ($p > 0.05$).

6.5 Care level

Fragile older people can be overwhelmed by the complexity of the expensive high technology general hospital care, and the benefits of medical interventions may be offset by loss of functional independence, complications from multiple medication, and simple despondency, especially during inpatient care.

There is evidence that geriatric care can improve older patient outcomes (10,166), though not as dramatically as some had hoped (166). Cohen et al has, in a RCT including 1388 patients, showed that neither inpatient nor outpatient intervention had a significant effect on mortality nor any synergistic effects between the two interventions (162). However, Cohen found a functional decline with inpatient evaluation and an improvement in mental health with outpatient evaluation (162).

A major goal in all programmes is to prevent or delay admission to long-term nursing homes. Many of the programmes rely on interdisciplinary teams with nurse specialists, social

workers, physiotherapists, occupational therapists and geriatricians working together (162,167). The common assumption is that aging is a poorly understood biological process that affects the manifestations of disease and recovery from illness.

There are numerous training programmes, inpatient and outpatient, in most Western societies. Most of these programmes are based on specialised care provided at specialised departments (10-11,167) or inpatient (12) or outward (outreach) teams (13-14,162-163). Outwards teams typically run programmes in patients' homes or at community based hospitals (13-14,162). Care of older patients has during the passed 25 years shifted from care in general hospital wards to care provided by specialised departments and specialised teams. At the same time there is a growing awareness that a health system dominated by secondary, tertiary and emergency care will tend to be fragmented, lacking in continuity, uncoordinated and costly (2,48,108,167).

However, many of the geriatric programmes target areas that can be handled by professionals other than physicians, and it may be that outward programmes provided by primary level therapists could be a suitable alternative. There are some concerns that the gap between primary and secondary care has been widened in the last few decades as the general hospitals have been growing more and more specialised with an increasing number of subspecialists whilst primary level has focused mostly on basic care needs and not so much on the patients' potential to maintain or to achieve better mental and physical function (104).

6.6.1 Results on care level Study I and Study II

Study I has shown that two expert panels have agreed that one of six older patients above 75 years of age had low or intermediate benefits from a general hospital admission. The general practitioners even assessed as much as four of ten, and these patients could probably have been treated outside the general hospital if appropriate care programmes and/or institutions at primary level had been available.

Study II has shown a decrease in readmissions to general hospital, an increase in the number of patients independent of community care and an increase in survival at a lower cost when prolonged care and/or rehabilitation are provided as intermediate care.

6.6 Intermediate care – could the components be precisely described?

In some studies multicomponent care is described as involving several professions in a holistic approach (multiprofessional team) (168-169). However, some questions remain unanswered; 1) why do some multicomponent interventions result in a better outcome than others? 2) why does a team of professionals function better than several professionals working independently?

The communication process is complex, and older people are a more heterogeneous group than younger people, and they have often had mixed past experiences having been subject to several diseases, diagnostic and treatment procedures. Health personnel and older people can have differing perceptions of; 1) what illness is and 2) what the consequences of illness are. Unclear communication could cause the whole medical encounter to fall apart (168).

The intermediate care intervention, mainly focusing on communication with the patients, the social and professional networks, at Søbstad Teaching Nursing Home is described in paper 4.

The physicians and nurses at Søbstad follow some basic communication rules (170):

- Allow extra time, as older people need more time and also want more information than younger people.
- Avoiding distractions by sitting alone with the patients
- Sit face to face as this gives better patient compliancy.
- Maintain eye contact, as this is a powerful form of nonverbal communication.
- Listen to what the patient has to say.
- Speak clearly, slowly and loudly.
- Use simple and understandable sentences.
- Talk about one topic at a time.
- Simplify and write down any instructions.
- Frequently summarise the most important topics, often together with family members.
- Give the patients an opportunity to ask questions and express themselves.
- Meet the patients with politeness and respect
- Keep the patient relaxed
- Enable the patients to manage their own situation

The good results shown in several studies where multicomponent/multiprofessional approaches have been used cannot be explained merely by communication skills alone. Neither is an explanation simply based on a team using a holistic approach sufficient. Obviously; when professionals work together as a team, the services will be coordinated, information will be systematised and more accessible for the patients, unnecessary examinations will be avoided and services will supplement each other instead of being competitive and even, in some cases, be counterproductive.

Antonovsky's theories on "The sense of coherence" (SOC) describe a salutogenic orientation towards a better health (59). When a person is confronted with a stressor, according to this theory, he will need to:

- Want to be motivated to cope (meaningfulness)
- Believe that the challenge is understood (comprehensibility)
- Believe that resources to cope are available (manageability)

Studies from Copenhagen (57) and Bergen (58) have shown that older people's possibilities and ability to cope at home and their psychological well-being are important factors when making a decision to stay at home or to move to a nursing home. In a social intervention programme in Britain caseworkers tailored the level of intervention to each older person's request for help (171). In this study half of the older persons declined several offers of help as these offers were not in accordance with their own wishes.

Maybe, the key to better health and better outcomes is motivational (meaningfulness) rather than cognitive (comprehensibility), and focusing, through communication, on what the patient believes is most important to enable him to cope in any given situation (manageability).

6.7 Intermediate care – a new term for an old health care model?

The intermediate care concept has not been discussed much in Norway so far. In Britain the concept has been defined as a model of care following nursing more than medicine, that patients are viewed holistically where "care" rather than "cure" dominates and care is delivered near the patients' home (164). The important element is maximising patients' and families' access, comfort and control where there are holistic assessments, and reassessments,

and flexible inputs from multi-professional teams. The plan with intermediate care seems to be either to send the patient home as quickly as possible or to keep the patient out of general hospitals (168).

There have been discussions in Britain about the goal of intermediate care; is it primarily a patient-focused or organisation-focused care form (34,164)? There are at the same time great concerns about the increasing costs of health care (1), and policies to shift the balance from secondary to primary care have therefore been a common theme in health service reforms (172).

It is a challenge to ensure that services are safe, effective and reliable when providing alternatives to general hospital care. It has been proven that comprehensive geriatric assessments with comprehensive therapeutic plans are effective means of identifying medical problems when associated with strong long-term management (169). Older patients, more than any other patients, need to be admitted to general hospitals to ensure correct diagnosis for diseases and geriatric assessments in the acute phase of their diseases (10-14,168,173). However, long-term management can be provided at intermediate level; either at a community hospital as shown in study II, or at home (163).

Probably the most important factor when providing intermediate care is the close communication with the patients and his networks combined with holistic, patient-focused intervention programmes provided by a multiprofessional team led by a skilled physician or nurse.

Is the circle complete? The old general practitioner hospitals (“sykestuer”) in Norway, which had more than 1000 beds in the sixties, provided, to some extent, this kind of care (46). Care was provided close to home where the local physicians and the local health teams, who knew the patients and their families, followed the patients closely instead of admitting them to general hospitals far away from home. May be, there will be a renaissance for these general practitioners hospitals (= community hospitals). However this time, not only as a place where patients could be admitted instead of general hospitals, but also as a place providing step-down care where older people can be treated and rehabilitated after having been properly diagnosed at a general hospital and before returning back to their own homes.

6.8 Discussion of the results

6.8.1. Study I – Paper I

When letters between primary level and secondary level, and vice versa, are missing vital information, serious consequences for the patients can result; especially, if there are uncertainties as to who is responsible for follow-up and what has to be followed-up. Older patients, many with reduced mental capacity, are the group most dependent on a health care system that is able to communicate and transfer duties in an exact and precise manner.

Specialists have a tendency to over-estimate the effect of their own speciality (148). However, several studies in Norway, the Netherlands and the UK confirm that appropriate care can be given at an intermediate level (48), at nursing homes or at general practitioner hospitals (43-47,96). The hospital physicians in the panels in study I had a higher degree of confidence in general hospital care than the general practitioners. The nurses, on the other hand, rated the usefulness of an alternative nursing home care highest. This disagreement between the professionals as to the benefits of general hospital admissions may be one of the greatest challenges for the understanding of professional collaboration. A much better dialog must be developed between health professionals, at primary and secondary level, to establish a consensus as to the definition of proper care in order to avoid unnecessary referrals to general hospitals and to secure a better follow-up after discharge.

In the present study there were no statistically significant associations between the quality of referral and discharge letters and the assessment of the benefit of the general hospital stay, other than ADL. A good description of ADL was strongly associated with a high benefit of general hospital care ($p < 0.001$).

Poor quality of the doctors' letters is probably one of several factors contributing to inappropriate care (174). Without information from primary services about the patients' normal ADL and medical status, hospital physicians have to deal with, in many cases, each disease as an isolated medical problem without any possibility of seeing the consequences of the present disease in light of the patient's daily social context. This again results in discharge letters written from a specialist's perspective without necessarily addressing the problems that caused the referral in the first place.

This study, along with others studies (64,66-72), demonstrated the need of establishing better systems for exchanging descriptions of care and other patient information between primary and secondary level. We believe that it is an urgent matter in the near future to establish a consensus between health professionals in primary care and in general hospitals on the obligations, limitations and possibilities at each level of care. There is too little knowledge and too many uncertainties about the duties, responsibilities and possibilities of the different care systems.

6.8.2. Study II – Paper II-IV

This study demonstrated that intermediate care at a community hospital was professionally an equal alternative to prolonged general hospital care; and that this type of care was cost effective.

After six and twelve months of follow-up patients offered intermediate care had lower readmission rates ($p=0.03$) and a higher number of patients independent of community care ($p=0.02$) than patients given traditional prolonged care at a general hospital. The differences in total days in institutions were minor. The differences in number of deaths and the need for home care were in favour of the intervention group, and there was even a statistically significant difference in the number of deaths after 12 months. The results from this trial were consistent with other comparable studies (14,95-96).

As all patients actively received standardised care regimes during their stay at the general hospital, at the community hospital, at the rehabilitation departments or when given community home care services, we believe that average costs per day and per hour provided a correct estimate of all costs. Capital costs were not included in the analyses. This might represent a weakness in the overall costs, but will most likely lead to underestimating the costs of the general hospital group. Costs for the intervention group were lower mainly due to a) costs at community hospital were lower, and b) the intervention group did not incur a sufficiently higher number of total treatment days to offset this effect. As noted previously, however, both community hospital and general hospital costs were average costs as measured from the accounts. The suggestion of this trial that care can be provided at an intermediate level at a community hospital to a lower cost than equivalent care at a general hospital, is robust, as the sensitivity analyses imply that the price per day at the community hospital had

to be increased with more than 99 % to reach a level similar to that estimated for general hospital care.

The present study appears to be the first randomised controlled trial where included patients have been an unselected general hospital population above 60 years of age. Another strength of this trial was that all patients received the same optimal care in the initial phase of their illness before randomisation.

As one of the authors, blinded as to which group the patients belonged to, collected all the information from medical records and from the patient administrative systems, information bias by collection was possible. As all the data concerned objective measures such as readmissions, use of home care and number of deaths, the registration was considered to be accurate.

Several efforts have been developed to reduce days of care and to facilitate discharge from general hospitals including discharge planning, nurse led inpatient care, hospital at home, general practitioners hospitals, community hospitals and patients hotels (96). Some studies have found a better functional outcome and reduced mortality when elderly patients were treated at a specialised geriatric ward (10-12), whilst the benefit of early supported discharge of stroke patients was ascribed to the structured collaboration between primary and secondary health care (20-46).

Several community hospitals in Norway are comparable to community hospitals in England (47) and general practitioner hospitals in Holland (43) where some studies have explored their appropriateness (14,43-44,95). In Norway the use of nursing homes and community hospitals may have been overlooked as appropriate alternatives, and research on such models has been sparse (44-45).

Which components contributed to the results?

A limitation with the provision of intermediate care is the lack of possibility to identify which of the components is most the effective. However, some of the main components in the intervention were assessments of ADL along with the close, continuous communication and cooperation with each patient, his social and professional networks in order to identify the best supportive solutions. This communication, including the continuous dialogue with the

rest of the primary health care providers in the municipality, was probably the central element that seems to have been efficient in reducing the number of readmissions, the need for community care and allowing the professional teams to optimise follow-up after discharge.

Care at an intermediate level provided a cost effective new link, between advanced care at a general hospital and primary level community home care, to optimise recovery before returning home after acute general hospital care. For this rapidly increasing group of chronically ill patients, often with acute exacerbations, initially handled at general hospitals, it seems mandatory to establish better routines for communication before discharge. The provision of care, in the recovery phase, at intermediate level at a community hospital can act as a bridge between general hospitals and home care that may reduce the need for admissions rather than replace them.

In a modern health care system care is more and more specialised, fragmented and organ-focused. In addition to the expansion of further sub-specialising in modern medicine, the results from this study underscore the additional need of better step-down care systems at an intermediate level. It is indeed relevant to question the appropriateness of prolonged traditional general hospital care for this rapidly increasing group of patients.

6.9 Ethical considerations

Clinical trials are experiments on human beings and fundamentally the patients' rights, legal (54) and ethical, have to be addressed carefully;

- Information has to be given, written and orally, in a manner that made it understandable for all participants (**Appendix 10.3**).
- All available information about all possible risks must be given.
- Participation must be out of choice and without any obligations.
- The written consent form has to be understandable and must contain correct information (**Appendix 10.4**).
- Information to the health personnel about their responsibilities to inform the patients with suitable procedures describing how to handle the recruitment of patients, how to give information and to get the consent (**Appendix 10.5**).

In study I all patient data was handled anonymously and according to the study protocol.

In study II the patients received oral and written information about the study, signed a personal consent form and had the right to withdraw from the study at any time. Staff at both Søbstad Teaching Nursing Home and the departments involved at St. Olavs University Hospital, received information about the study and were reminded about relevant procedures several times during the study.

Before the study started there were some concerns about the early discharge of fragile, ill patients to care at primary level. As a consequence it was decided to terminate the study if there should be any increase in the number of deaths within the intervention group. Number of deaths was therefore monitored continuously during the whole study.

The Regional Ethical Committee for Medical Research evaluated the study protocols both for study I and study II, approved both trials and the patient information and consent form in study II. The Norwegian Data Inspectorate had also approved both studies.

6.10 Final remarks

Primary level services and primary level health professionals have several important tasks and roles;

- As gatekeepers to secondary level as only 10 % of patients are referred to secondary level. This function has to be strengthened in the future to prevent an uncontrolled increase in health service costs (1).
- As experts in teams/panels when care guidelines are developed and implemented at both primary and secondary level of health care.
- As care providers when chronically ill patients and/or acute ill older persons have been diagnosed at general hospitals and readmitted to community care.

Maybe, the focus must shift from an “all inclusive” care at each level to a dialog and collaboration where the main focus has to be; 1) what are each levels supplementary tasks to each other, 2) to whom care should be given and 3) which level has the ability to provide the most cost-effective and the most appropriate care in each individual case.

7.0 What does this thesis add? – Main messages and conclusions.

7.1. Study I

Both referral and discharge letters lack vital medical information, and referral letters to such an extent that it may represent a health hazard for patients. There is low consensus between health professionals at primary and secondary level of what good quality is as regards referral and discharge letters and what indicates a high level of benefit from general hospital care. The specialists denoted that 77 % of the patients had a high level of benefit from the general hospital admission and the general practitioners only 59 %. This difference is particular interesting as the general practitioners are supposed to be the gatekeepers to general hospital care.

Main conclusions study I:

1. It is necessary to develop common consensus between health professionals and health administrators as to the content of supplementary responsibility for the care providers at primary and secondary level.
2. It is an urgent matter to create national consensus on what vital health information has to be readily available for the health care professionals at both primary and secondary level when it is needed for the provision of appropriate care.

7.2. Study II

Intermediate care at a community hospital reduced the number of readmissions to the general hospital significantly and increased significantly the number of patients who were independent of community care after 26 weeks of follow-up, with an insignificant increase in days in institutions in comparison to traditional prolonged care at a general hospital.

Restricted analyses to acute hospitalised older patients allocated to intermediate care at a community hospital showed that the care at the community hospital was cheaper than prolonged care at the general hospital, and this cost difference was sustained over a period of 12 months.

Main conclusions study II:

1. Care at intermediate level at a community hospital was cost effective from a health service perspective and gives better patient outcome as more patients had a better functional status and significantly fewer patients were dead after 12 months of follow-up.
2. It is mandatory to establish better after-care services for older patients admitted to general hospitals as a step-down care between home care and specialised general hospital care.

8.0 Suggestions for further research

8.1. Study I

- There are so far no models for communication between physicians at primary and secondary level securing sufficient quality when exchanging medical information, and trials have to be performed on new core electronic health record systems (175):
 - o to test different models for exchanging vital information
 - o to establish consensus on what vital information is
 - o to test models to access necessary basic health information in emergency situations

8.1. Study II

- There is little existing scientific evidence as to the benefits of intermediate care and more randomised controlled trials are necessary to test different models for intermediate care at community hospitals and hospital at home regimes (176):
 - o As alternatives to general hospital admissions
 - o As alternatives to prolonged general hospital care
- Additionally, the economic consequences of different intermediate models have to be explored.
- Further randomised controlled trials are necessary to test which parts of intermediate care are essential to achieve the best patients' outcomes.
- The present study should be repeated to test if the results are reproducible in other settings.

9.0 References

1. Dang T, Antolin P, Oxley H: Fiscal Implications of Ageing: Projections of age-related spending. Economics departments working papers no. 305, ECO/WKP(2001)31. Paris: Organisation for Economic Co-operation and Development (OECD).
2. Carpenter GI. Accuracy, validity and reliability in assessment and evaluation of services for older people: the role of the interRAI MDS assessment system. *Age and Aging*. 2006; 35(4):327-329.
3. St. Olavs Hospital. [Styreprotokoll 22. juni 2006: Sak 34/06 Arkivsak 06/1415-31]. Trondheim, Norway; 2006. (<http://www.stolav.no/stolav/resources/moteprotokoll%2022.06.06.doc>) (06.08.06)
4. Statistisk sentralbyrå. Fremskrivning av folkekengden 2002-2050. Oslo; 2005. (http://www.ssb.no/emner/02/03/nos_folkfram/nos_d319/tab/tab-14.html) (27.07.06)
5. Statistisk sentralbyrå. Heldøgnsopphold og liggedager per 1000 innbyggere, etter kjønn og alder.2000-2002. Oslo 2003. <http://www.ssb.no/emner/03/02/pasient/arkiv/tab-2003-04-25-06.html> (18.04.04)
6. SINTEF Health Research. Hospital Statistics 2005. Trondheim, Norway; 2006. http://www.shdir.no/vp/multimedia/archive/00012/Sykehusopphold_i_Nor_12791a.pdf (12.10.2007)
7. Statistisk sentralbyrå. Helseutgifter etter type tjeneste. 1997-2005. Oslo; 2006. <http://www.ssb.no/emner/09/01/helsesat/arkiv/tab-2006-05-30-02.html> (12.10.07)
8. Soisial- og helsedirektoratet. Hva er DRG-systemet. http://www.shdir.no/kodeverk_og_pasientklassifiseri/drg/ (12.10.07)
9. Jagger C, Matthews R, Spiers N et al. Compression Or Expansion Of Disability? Forecasting Future Disability Levels Under Changing Patterns of Diseases. Final report. KF 117 02/06. University of Leicester, 2006.
10. Saltvedt I, Mo ES, Fayed P, Kaasa S, Sletvold O. Reduced mortality in treating acutely sick, frail older patients in a geriatric evaluation and management unit. A prospective randomized trial. *J Am Geriatr Soc*. 2002;50(5):792-8.
11. Asplund K, Gustafson Y, Jacobsson C et al. Geriatric-based versus general wards for older acute medical patients: A randomized comparison of outcomes and use of resources. *J Am Geriatr Soc* 2000;11:1381-8.

12. Slaets JP, Kaufmann RH, Duivnvoorden HJ, Pelemans W, Schudel WJ. A randomized trial of geriatric liaison intervention in elderly medical inpatients. *Psychosom Med* 1997;59(6):585-91.
13. Applegate WB, Miller ST, Graney MJ et al. A randomized, controlled trial of a geriatric assessment unit in a community rehabilitation hospital. *N Engl J Med* 1990;332(22):1572-8.
14. Green J, Young J, Forster A et al. Effects of locality based community hospital care on independence in older people needing rehabilitation: randomised controlled trial. *BMJ* 2005;331:317-322
15. Kopjar B, Guldvog B, Hay K. Reinnleggelser som kvalitetsindikator? En analyse av reinnleggelser i norske sykehus. HELTEF rapport 1/99. Nordbyhagen: Stiftelsen helsetjenesteforskning, 1999.
16. Indredavik B, Fjaertoft H, Ekeberg G et al. Benefit of an extended stroke unit service with early supported discharge: A randomized trial. *Stroke* 2000;31:2989-94.
17. Statistisk sentralbyrå. Antall døgnopphold. 1995-2005. Oslo; 2006.
<http://129.241.253.18/cognos/cgi-bin/ppdscgi.exe?FN=2DF6BCFA5903...> (09.07.06) New statistics 1999-2006):
http://statbank.ssb.no/statistikkbanken/Default_FR.asp?Productid=03.02&PXSid=0&nvl=true&PLanguage=0&tilside=selecttable/MenuSelP.asp&SubjectCode=03 (12.10.07)
18. Statistisk sentralbyrå. Heldøgnsopphold ved sykehus etter alder og diagnose. Oslo; 2006.
<http://www.ssb.no/pasient/arkiv/tab-2006-04-20-01.html> (12.10.2007)
19. Statistisk sentralbyrå. 24 hour hospitalisations in Norway 80 years and older. 1995-2005. Oslo; 2006.
[bin/ppdscgi.exe?BZ=1AAABbDA~rbwABEwU6VFChhEZNJC2AwPNmzlw0tAJwybNnDB00rxxM~cWadw_cfJGzp0weUwIidJjDAwYMbuffiGZQ80umXoiQbJOzMKcDokmZcLMqSOnbKNg5AjChu194JSRW1dk83cqOLtmwOwrE7NPbFdObRCTaHgREkTrsXZq1Gx888aWxfjz~oi_rhscNWi6DJMnU_VW81tQ3beGg0aOmE6UTFHPu~ZrjG8LoAkj9pjc0JnL2XKkcFWOw32Q2Q34Bw==](http://129.241.253.18/cognos/cgi-bin/ppdscgi.exe?BZ=1AAABbDA~rbwABEwU6VFChhEZNJC2AwPNmzlw0tAJwybNnDB00rxxM~cWadw_cfJGzp0weUwIidJjDAwYMbuffiGZQ80umXoiQbJOzMKcDokmZcLMqSOnbKNg5AjChu194JSRW1dk83cqOLtmwOwrE7NPbFdObRCTaHgREkTrsXZq1Gx888aWxfjz~oi_rhscNWi6DJMnU_VW81tQ3beGg0aOmE6UTFHPu~ZrjG8LoAkj9pjc0JnL2XKkcFWOw32Q2Q34Bw==) (10.12.06) New statistics 1999-2006:
http://statbank.ssb.no/statistikkbanken/Default_FR.asp?Productid=03.02&PXSid=0&nvl=true&PLanguage=0&tilside=selecttable/MenuSelP.asp&SubjectCode=03 (12.10.07)
20. Statistisk sentralbyrå. Folkemengde etter alder og tid. Oslo; 2006.
<http://statbank.ssb.no/statsikkbanken>. (09.07.06)
21. Statistisk sentralbyrå. Heldøgnsopphold, liggedager og gjennomsnittlig liggetid ved somatiske sykehus. <http://www.ssb.no/aarbok/2006/tab/tab-135.html> (12.10.07)

22. Statistisk sentralbyrå. Hjemmesykepleie. Behandlede pasienter. 1965-92. Oslo; 2005.
<http://www.ssb.no/histstat/tabeller/4-4-17t.txt> (10.12.06)
23. Statistisk sentralbyrå. Motakarar av heimetenester, etter alder. 1992-2005. Oslo; 2006.
<http://www.ssb.no/emner/03/02/helsetjko/arkiv/tab-2006-12-08-05.html> (12.10.07)
24. Romøren TI. Den fjerde alderen. Funksjonstap, familiesorg og tjenestebbruk hos mennesker over 80 år. Oslo (Gyldendal).2001.
25. Plan for eldreomsorgen i Trondheim kommune 2007-2015. Trondheim;2006.
26. St. Olavs University Hospital. Annual report 2001. [Årsrapport 2001] Trondheim; 2002.
27. St. Olavs University Hospital. Annual report 2003. [Årsrapport 2003] Trondheim; 2004.
28. Municipality of Trondheim. Annual report 2005. [Årsstatistikker 2005].Trondheim; 2006.
29. Statistisk sentralbyrå. Folkemengde, etter kjønn i viktige aldersgrupper.1995-2000-2005.
<http://statbank.ssb.no/statistikkbanken> (10.12.06)
30. Municipality of Trondheim. Annual report 1995. [Årsstatistikker 1995].Trondheim; 1996.
31. Statistisk sentralbyrå. Folkemengde, etter kjønn i viktige aldersgrupper.1995-2000-2005.
<http://statbank.ssb.no/statistikkbanken> (08.07.06).
32. Egenbetaling for helse – og velferdstjenester. 2006. Trondheim, 2006.
<http://www.trondheim.kommune/content.ap?thisId=968583968> (10.07.06).
33. Fink A, Kosecoff J, Chassin M, Brook RH. Consensus methods: Characteristics and guidelines for use. Am J Public Health. 1984 Sep;74(9):979-83.
34. Campbell S, Cantrill JA, Roberts D. Prescribing indicators for UK general practice: Delphi consultation study. BMJ 2000;321:425-428.
35. Mosca L, Appell L, Benjamin E et al. Evidence-based guidelines for cardiovascular disease prevention in women. J Am Coll Cardiol 2004;43:900-922.
36. Akins RB, Tolson H, Cole BR. Stability of response characteristics of a Delphi panel: application of bootstrap data expansion. BMC Med Res Methodol 2005 Dec 1;5:37.
37. Jones J, Hunter D. Consensus methods for medical and health services research. BMJ 1995;311:376-80.
38. Hasson F, Keeney S, McKenna H. Research guidelines for the Delphi survey technique. J Adv Nurs 2000 Oct (4):1008-15.
39. Garåsen H, Kaasa S, Røstad T, Broen P. Spesialiserte korttidsplasser i sykehjem - Trondheimsmodellen. Tidsskr Nor Lægeforen 2005; 125: 1503-5.

40. Jakobsen G. Specialised palliative care at a nursing home - Description of an integrated model of palliative care and comparison between hospital palliative care and nursing home palliative care. Trondheim; Master Thesis in Health Science, NTNU, 2006.
41. Haugen DF, Jordhøy M, Engstrand P, Hessling S, Garåsen H: Organisering av palliasjon i og utenfor sykehus. Tidsskrift Nor Lægeforen 2005;126:329-32.
42. Garåsen H, Johnsen R. Scenarier fra samarbeidet mellom Trondheim kommune og spesialisthelsetjenesten i Sør-Trøndelag i perioden 1993- 2004. Tidsskr Nor Lægeforen 2005; 125: 1198-200.
43. Hakkaart-van Roijen L, Moll van Charante EP, Bindels P et al. A cost study of a general practitioner hospital in the Netherlands. European Journal of General Practice. 2004;10:45-49.
44. Aaraas I, Melbye H, Eriksen BO, Irtun O. Is the general practitioner hospital a potential "patient trap"? A panel study of emergency cases transferred to higher level hospitals. Scand J Prim Care 1998 Jun; 16(2)76-80.
45. Aaraas I. The Finnmark general practitioner study. Patient characteristics, patient flow and alternative care level. Scand J Prim Health Care 1995;13:250-6.
46. Aaraas I, Forde OH, Kristiansen IS, Melbye H. Do general practitioners hospitals reduce the utilisation of general hospital beds? Evidence from Finnmark County in North Norway. J Epidemiol Community Health 1998;52:243-6.
47. Donald IP, Jay T, Lidsell J, Foy C. Defining the appropriate use of community hospital beds. British Journal of General Practice 2001;51:95-100.
48. British Geriatrics Society. Intermediate Care. Guidance for Commissioners and Providers of Health and Social Care (revised 2004). BGS Compendium Document 4.2. London; 2004. http://www.bgs.org.uk/Publications/Compendium/compend_4-2.htm (29.07.06).
49. Scenario 2030. Sykdomsutviklingen for eldre frem til 2030. IK 2696. Oslo: Statens helsetilsyns utredningsserie, 2000.
50. Yang Z, Norton E, Stearns S. Longevity and Health Care Expenditures. The Real Reasons Older People Spend More. The Journal of Gerontology Series B: Psychological Sciences and Social Sciences 2003;58:S2-S10.
51. SOU 2000:6. Døden angår oss alla. Stockholm; 1999. <http://www.regeringen.se/sb/d/108/a/2867> .
52. Gray A: Population Ageing and Health Care Expenditure. Aging Horizons.2005;2:15-20.
53. Eggen B, Løvseth S, Sletvold O, Åm T, Roos E: Evaluering av avtalen om utskrivningsklare pasienter inngått i 1994 mellom Sør-Trøndelag fylkeskommune og Trondheim kommune. Rapport. Trondheim 1995.
54. Morris J. Decent health care for older people. Editorial. BMJ 2006;332:1166-1168.

55. Borgenhammar E. Patients' rights and informed consent: Swedish experiences (Abstract). Springer Link. <http://www.springerlink.com/content/u041m2t483845122/> (11.12.06).
56. Pasientrettighetsloven. [The Patients' Rights Act] Oslo; 2000. <http://www.lovddata.no/all/nl-19990702-063.html> (11.12.06).
57. Almind G, Holstein BE, Larsen BS. [Advice about the types of residence for elderly sick people. A study of the forms of residence preferred by 470 pensioners]. [Danish]. Ugeskrift for Laeger 1986. 148;1297-9.
58. Leland A. Hvor ønsker pleieavhengige eldre å bo? En undersøkelse om hvilken sammenheng det kan være mellom boensker og boforhold, fysisk funksjonsevne, psykisk velvære, sosiale forhold og mestringsevne. Hovedfagsoppgave i helsefag hovedfag. Det medisinske fakultet, Universitet i Bergen, 2001.
59. Antonovsky A. The salutogenic model as a theory to guide health promotion. Health Promotion International 1996;11:11-18.
60. Municipality of Trondheim. [Where do older people want to live getting older?] [In Norwegian]. Report 2007; Trondheim.
61. Brevik I, Schmidt L: Slik vil eldre bo. [How want older people live?] [In Norwegian]. Oslo; NIBR Report 2005:17.
62. Parker MJ, Handoll HHG, Griffiths R: Anesthesia for hip fracture in adults. (Review). Cochrane Database of Systematic Reviews 2006 Issue 4. Art.No.:CD000521.D01: 10.1002/14651858.CD00521.pub2.
63. Tjerrild SB, Jakobsen AM, Poulsen TS, Andersen LI, Mickley H: [Coronary angioplasty and coronary artery bypass surgery in older patients. Incidence, complications and mortality, 1999-2003][In Danish]. Ugeskr Laeger 2006. 9;168:3521-5.
64. Newton J, Eccles M, Hutchinson A. Communication between general practitioners and consultants; what should their letters contain? BMJ 1992 28;304(6830):821-4.
65. Norwegian Centre for Informatics in Health and Social Care (KITH). Trondheim, Norway: KITH; 2002. [<http://www.kith.no/upload/1085/R32-02EpikriseMedFagligInnhold.pdf>]. [In Norwegian]. (Accessed 4 Aug 2006).
66. Bolton P, Mira M, Kennedy P et al. The quality of communication between hospitals and general practitioners: an assessment. J Qual Pract 1998;18(4):241-247.
67. Rognstad S, Straand J. Do general practitioners know what medication community nurses give their shared patients? [In Norwegian]. Tidsskr Nor Laegeforen 2004;124:810-812.
68. Jensen SA, Oien T, Jacobsen G, Johnsen R. [Erroneous drug charts – a health hazard?] [In Norwegian]. Tidsskr Nor Laegeforen. 2003;123:3598-9.

69. Ramrakha S, Giles A: Take a letter...an audit of GP referrals in south west Sydney. *Aust Fam Physician* 2001;30:395-8.
70. Kværner KJ, Tjerbo T, Botten G et al. Hospital discharge informations as communication tool. [In Norwegian]. *Tidsskr Nor Legeforen* 2005;125:2815-7.
71. Solet DJ, Norvell JM, Rutan GH et al. Lost in transition: challenges and opportunities in physician-to-physician communication during patient handoffs. *Acad Med* 2005;80(12):1094-9.
72. Arora V, Johnson J, Lovinger D et al. Communication failures in patient sign-out and suggestions for improvement: a critical incident analysis. *Qual Saf Health Care* 2005;14(6):394-6.
73. Roth-Isigkeit A, Harder S. [Reporting the discharge medication letter. An exploratory survey of family doctors.] [In German]. *Med Klin (Munic)*, 2005;100(2):87-93.
74. Rubak SI, Mainz J. [Communication between general practitioners and hospitals.] [In Danish]. *Ugeskr Laeger*. 2002;162:648-53.
75. Bourke JL, Bildbak-Olesen I, Nielsen PM et al. [Joint charts in drug handling. Toward increased drug safety.] [In Danish]. *Ugeskr Laeger*. 2001;163:5556-60.
76. Harris MF, Giles A, O'Toole BR. Communication across the divide. A trial of structured communication between general practice and emergency departments. *Aust Fam Physician* 2002;31(2):197-200.
77. Jiwa M, Skinner P, Coker AO, Shaw L, Campbell MJ, Thompson J. Implementing referral guidelines: lessons from negative outcome cluster randomised factorial trial in general practice. *BMC Family Practice* 2006;7:65.
78. Mackintosh JM, McKeown T, Garratt FN. An examination of the need for hospital admission. *Lancet* 1961;19611:815-818.
79. Syse A, Uchermann A, Forde OH: [Medical benefits from hospital stay. An evaluation of the hospital stay by patients hospitalized in an internal department in a trisected hospital]. [In Norwegian]. *Tidsskr Nor laegerfor* 1983; 103:1335-9.
80. Restuccia JD. The evolution of hospital utilization review methods in the United States. *Int J Qual Health Care* 1995;7:253-260.
81. Gertman PM, Restuccia JD. The Appropriateness Evaluation Protocol. A Technique for assessing Unnecessary Days of Hospital Care. *Med Care* 1981;19:855-871.
82. Payne SM. Identifying and managing inappropriate hospital utilization: a policy synthesis. *Health Serv Res* 1987;22:709-769.

83. Bjørnstad E, Bergersen, Nordhaug B, Abildgaard U, Stene-Larsen G. [Admissions to medical wards. Are resources used in accordance to patients' needs?]. [In Norwegian]. Tidsskr Nor Laegeforen 1990;110:3362-5.
84. Oie BK, Fanebust R. [Emergency admissions to a department of internal medicine. Are departments of internal medicine used optimally, and how would observation units affect the management of the department?]. [In Norwegian]. Tidsskr Nor Laegeforen 1993;113:836-8.
85. Eriksen BO, Almdahl SM, Hensrud A, Jaeger S, Kristiansen IS, Murer IS, Nord E, Pape JF, Robertsen R, Thoresen G. Assessing health benefit from hospitalization. Agreements between expert panels. Int J Technol Assess Health Care 1996;12:126-35.
86. Eriksen BO, Kristiansen IS, Nord E et al. Does admission to a department of internal medicine improve patients' quality of life? J Int Med 1998;244:397-404.
87. Eriksen BO, Kristiansen IS, Nord E, Pape JF, Almdahl SM, Hensrud A, Jaeger S. The cost of inappropriate admissions: A study of health benefits and resource utilisation in a department of internal medicine. J Intern Med 1999 246(4):379-87.
88. Zook CJ, Moore FD. High-cost users of medical care. N Engl J Med 1980;302:996-1002.
89. Pompei P, Charlson ME, Sax FL et al. Trade-offs between hospital charges and patient outcomes. Am J Med Sci 1988;295:418-423.
90. Lubitz JD, Riley GF. Trends in Medicare payments in the last year of life. N Engl J Med 1993;328:1092-1096.
91. Scitovsky AA. "The high cost of dying" revisited. Milbank Q 1994;72:561-591.
92. Scitovsky AA. Medical care in the last twelve months of life: the relation between age, functional status, and medical care expenditures. Milbank Q 1988;66:640-66.
93. Nord E, Hjort PF. [Health care consumption in the last year of life. Part of total health care consumption]. [In Norwegian]. Tidsskr Nor Lageforen. 1988;108:3265-3267.
94. Lithman T, Noreen D, Norlund A et al. [A substantial part of health resources is reserved for the dying. Cost analysis of terminal care]. [In Swedish]. Lakertidningen 1994;91:4390-4392.
95. Round A, Crabb T, Buckingham K et al. Six months outcomes after emergency admission of elderly patients to a community or a district general hospital. Family Practice. 2004; 21(2):173-179.
96. Hensher M, Fulop N, Coast E et al. Better out than in? Alternatives to acute hospital care. BMJ 1999;319:1127-1130.
97. Kvamme OJ, Olesen F, Samuelson M: Improving the interface between primary and secondary care: a statement from the European Working Party on Quality in Family Practice (EQuiP). *Qual Health Care* 2001, 10:33-9.

98. Kvamme OJ. Samarbeid mellom legar. Ein studie av intervensjonar i samarbeid mellom allmennlegar og sjukehusleger, ved akuttinnleggingar i somatisk sjukehus. [Cooperation between doctors]. [In Norwegian]. Doctorial thesis. University of Oslo; 2000.
99. Fjaertoft H, Indredavik B, Magnussen J et al. Early Supported Discharge for Stroke Patients Improves Clinical Outcome. Does It Also Reduce Use of Health Services and Costs? *Cerebrovasc Dis* 2005;19(6):376-383.
100. Stuck AE, Aronow HU, Steiner A, Alessi CA, Bula CJ, Gold MN, Yukas KE, Niesenbaum R, Rubenstein LZ, Beck JC. A trial of annual in-home comprehensive geriatric assessment for elderly people living in the community. *N Eng J Med* 1995;333:1184-9.
101. Gjørup T, Rasmussen L, Andersen JS. Bedre medicinske forløp. [Better medical care]. [In Danish]. *Ugeskr Laeger* 2005;167:2434-38.
102. Rasmussen JH, Gjørup T. Kan indlæggelse på et sundhetacenter af akutte medicinske patienter erstatte innlæggelse på hospital? [Can admissions of acutely ill internal patients to an intermediate care unit replace hospital admission?]. [In Danish]. *Ugeskr Laeger* 2003;165:4640-5.
103. Griffiths P, Harris R, Richardson G, Hallett N, Heard S, Wilson-Barnett J. Substitution of a nursing-led inpatient unit for acute services: randomized controlled trial of outcomes and cost nursing-led intermediate care. *Age Aging* 2001;30:483-8.
104. Walsh B, Steiner A, Pickering RM, Ward-Basu J. Economic evaluation of a nurse led intermediate care versus standard care for post-acute medical patients: cost minimisation analysis of data from a randomised controlled trial. *BMJ* 2005;330:699.
105. Griffiths P, Edwards M, Forbes A, Harris R, Ritchie G. Effectiveness of intermediate care in nursing-led in-patient units. *Cochrane database Syst Rev* 2007;(2):CD002214.
106. Wanless D. Securing Good Care for Older People. Taking a long-term view. King's Fund, London: 2006.
107. NHS. Department of Health. Our health, our care, our say: a new direction for community services. Health and care working together in partnership. White paper. London:2006.
108. NOU 2005:3. Fra stykkevis til helt. En sammenhengende helsetjeneste. Oslo; 2005.
109. Schizofreni. Kliniske retningslinjer for utredning og behandling. 9-2000. IK- 2726. Oslo: Statens helsetilsyn, 2000.
110. Sosial- og helsedepartementet. Respiratorbehandling i hjemmet. Rundskriv I-45/99. Oslo; 1999.
111. Coast J, Inglis A, Frankel S. Alternatives to hospital care: what are they and who should decide? *BMJ* 1996; 312:162-166.

112. Statistics of Norway. Beds in hospitals and maternity homes. 1930- 1991. Oslo; 2005. <http://www.ssb.no/histstat/tabeller/4-4-20t.txt> (08.07.06).
113. Statistics of Norway. Somatiske sykehus. 2002-2005. Nøkkeltall. <http://www.ssb.no/speshelsesom/> (09.07.06).
114. Statistics of Norway. Beds in institutions for the aged and disabled. 1970-1992. Oslo; 2005. <http://www.ssb.no/histstat/tabeller/4-4-19t.txt> (08.07.06).
115. Statistics of Norway. Bebuarar i institusjonar for eldre og funksjonshemma, etter alder. 1992-2005. Oslo; 2006. <http://www.ssb.no/emner/03/02/helsetjko/arkiv/tab-2006-06-30-03.html> (12.10.07)
116. Statistics of Norway. Home nursing. Patients treated. 1965-1992. Oslo;2005. <http://www.ssb.no/histstat/tabeller/4-4-17t.txt> (08.07.06).
117. Statistics of Norway. Mottakarar av heimetenester, etter alder. 1992-2005. Førebels tal 2005. Oslo; 2006. <http://www.ssb.no/emner/03/02/helsetjko/arkiv/tab-2006-06-30-05.html> (02.10.07).
118. Campbell SM, Shield T, Rogers A, Gask L. How do stakeholder groups vary in a Delphi technique about primary health care and what factors influence their ratings? *Qual Saf Health Care* 2004;13:428-434.
119. Altman DG. *Practical Statistics for Medical Research* page 15-16. 1st edition. London: Chapman & Hall, 1991.
120. Essink-Bot ML, Stuijbergen MC, Meerding W, Looman CWN, Bonsel GJ. Individual differences in the use of the response scale determine valuations of hypothetical health status: an empirical study. *BMC Health Services Research* 2007, 7:62.
121. Nylenna M, Larsen Ø: Finnes det en egen norsk identitet? *Tidsskr Nor Lagerforen* 2005;125;1813-6.
122. St.meld. nr. 9 (1974-75). *Sykehusbygging i et regionalisert helsevesen*. Oslo; 1974.
123. Altman DG. *Practical Statistics for Medical Research* page 404-8. 1st edition. London: Chapman & Hall, 1991.
124. Flies JL. The measurement of Interrater Agreement In *Statistical Methods for Rates and Proportions*. New York: John Wiley, 1981:213-2326.
125. Feinstein AR, Cichetti DV. High agreement but low kappa: I: The problems of two paradoxes. *J Clin Epidemiol* 1992;43:543-9. (Abstract).
126. Cichetti DV, Feinstein AR. High agreement but low kappa: II: Resolving the paradoxes. *J Clin Epidemiol* 1992;43:551-8. (Abstract).

127. Krummenauer F. Differenzenplots oder Punktwolken – wann was anwenden? [Difference plots or scattergram--when to use which?]. [Article in German]. *Klin Monatsbl Augenheilkd* 2002;219(9):682-5.
128. Rosner B. *Fundamentals of Biostatistics*, page 591-596. 5th edition. Pacific Grove, CA: Duxbury, 2000.
129. Altman DG. *Practical Statistics for Medical Research* page 86-91. 1st edition. London: Chapman & Hall, 1991.
130. Clinical Trial Registration. NCT00235404.
<http://www.clinicaltrials.gov/ct/show/NCT00235404?order=5> (11.10.2007)
131. Devold R. Gerix-informasjon for primærhelsetjenesten. Oslo: Gryting AS, 1994.
132. Holmøy J. Gerix 1995-1999. Dokumentasjon, system, data, program. Oslo; SSB, 2002.
http://www.ssb.no/emner/03/90/notat_200210/notat_200210.pdf (23.08.06).
133. Holmøy J. Pleie og omsorgstjenester 1995-1999. Noen hoedvtall basert på GERIX-data. Oslo; SSB, 2001. http://www.ssb.no/emner/03/03/20/rapp_200112/rapp_200112.pdf (23.08.06).
134. Carpenter I, Teare GF, Steel K, Berg K, Murphy K, Bjornson J et al. A new assessment for elders admitted to acute care: reliability of the MDS-AC. *Aging (Milano)* 2001;13(4):316-30.
135. Reynolds T, Thornicroft G, Abas M, Woods B, Hoe J, Leese M, Orrel M. Camperwell Assessment of Need for the Elderly (CANE). *The British Journal of Psychiatry* 2000;176:444-452.
136. Carpenter I, Perry M, Challis D, Hope K. Identification of registered nursing care of residents in English nursing homes using Minimum Data Set Resident Assessment Instrument (MDS/RAI) and Resource Utilisation Groups version III (RUG-III). *Age and Aging* 2003;32:279-285.
137. Sosial- og helsedirektoratet. Rapport fra prosjekt. samlemål for funksjonssvikt i IPLOS. Februar 2005.
http://www.shdir.no/publikasjoner/rapporter/rapport_fra_prosjekt_samlem_1_for_funksjonsvaeriablene_i_iplos_av_feb_2005_52630 (12.10.07)
138. Brouwer BF, Rutten FFH. Health economics. A bridge over troubled water. *European Journal of Public Health* 2001;1:234-236.
139. Webb SB jr, Berzins E, Wingardner TS, Lorenzi ME. First year hospitalization costs for the spinal cord injured patient. *Paraplegia* 1978;15:311-8.
140. Jones J, Wilson A, Parker H, Wynn A, Jagger C, Spiers N, Parker G. Economic evaluation of hospital at home versus hospital care: cost minimisation analysis of data from randomised controlled trial. *BMJ* 1999;319:1547-1550.

141. Zigon G, Rosato R, Bo S, Gregori D. A Comparison of Analytic Models for the Costs of the Hospitalized Diabetic patients. *Metodoloski zvezki*. 2005; 1(2):135-145.
142. Young TA. Estimating mean total cost in the presence of censoring: a comparative assessment of methods. *Pharmacoeconomics*. 2005;23(12):1229-42.
143. O'Hagan A, Stevens JW. On estimators of medical costs with censored data. *Journal of Health Economics*. 2004;23:615-625.
144. SINTEF Health Research. Evaluering av Henie-Onstad Bo- og Rehabiliteringssenter. Trondheim;2005.
145. Altman DG. *Practical Statistics for Medical Research*, page 455-60. 1st edition. London: Chapman & Hall, 1991.
146. Coulter I, Adams A, Shekelle P. Impact of varying panel membership on ratings of appropriateness in consensus panels: a composition of multi- and single disciplinary panel. *Health Serv Res* 1995;30:577-91.
147. Campbell SM, Hann M, Roland MO et al. The effect of panel membership and feedback on ratings in a two-round Delphi survey. *Med Care*. 1999;37:964-8.
148. Ayanian JZ, Landrum MB, Normand SL, Guadagnoli E, McNeil BJ. Rating the appropriateness of coronary angiography – do practicing physicians agree with an expert panel and with each other? *N Engl Med* 1998;338:1896-1904.
149. Atkins RB, Tolseon H, Coole BR. Stability of response characteristics of a Delphi panel: application of bootstrap data expansion. *BMC Med Res Methodol*. 2005;5:37,
150. Kalant N, Berlinguet M, Diodiati JG, Gragatakis I, Marcotte F. How valid are review tools in assessing the appropriate use of acute care beds? *CMAJ* 2000;162:1809-1813.
151. Lawrence M, Olesen F. Indicators of quality in health care. *European Journal of General Practice* 1997;3:103-108.
152. Grol R, Buchan H. Clinical guidelines: what can we do to increase their use? *Medical Journal of Australia* 2006;185:301-302.
153. Health Personnel Act. Oslo; 2000.
154. Ward D, Severs M, Dean T, Brooks N. Care home versus hospital and own home environments for rehabilitation of older people, *Cochrane Database Syst Rev*. 2003;(2):CD003164.
155. Detsky AS, Redelmeier DA. Editorial: Measuring health outcomes—putting gains into perspectives. *NEJM* 1998;339:402-405.
156. Wright JC, Weinstein MC. Gains in life expectancy from medical interventions—standardising data on outcomes. *NEJM* 1998;339:380-6.

157. Kaplan RM. The significance of quality of life in health care. *Qual Life Res* 2003;12:3-16.
158. Hamre R. Bruk av kartleggingssystemet "Gerix" I den kommunale omsorgstjenesten. [The usage of Gerix in community health care]. [In Norwegian]. Trondheim; Student Thesis. Medical Faculty, NTNU, 2004.
159. Jonsson P, Finne-Soveri H, Jensdottir AB, Ljunggren G, Bucht G, Grue EV, Noro A, Bjørnson J, Jonsen, Schroll M. Co-morbidity and functional limitation in older patients underreported in medical records in Nordic Acute care Hospitals when compared with the MDS-AC instrument. *Age and Aging* 2006;35:434-438.
160. Bondahl AI, Grue EV, Bjørnson J. "Står det noe sted?" Eldre pasienter registrert ved hjelp av RAI-MDS-AC og sykehusets dokumentasjonssystem. En sammenligning av dokumentasjon ved medisinsk avdeling. Rapport. Oslo; Diakonissehjemtes sykehus, 1999.
161. Fjærtøft H. Extended stroke unit service and early supported discharge. Short and long-term effects. Trondheim; Doctorial Thesis. Medical Faculty, NTNU,2005:205.
162. Cohen HJ, Feussner JR, Weinberger M, Carnes M, Hamdy RC, Hsieh F et al. A controlled trial of inpatient and outpatient geriatric evaluation and management. *NEJM* 2002; 346:905-12.
163. Anderson C, Rubenach, Mhurchu CN, Clark M, Spencer C, Winsor A. Home or hospital for stroke rehabilitation? Results of a randomized controlled trial: I: health outcomes at 6 months, *Stroke* 2000;31:1024-31.
164. Lyons RA, Crome P, Monaghan S, Killalea D, Daley JA. Health status and disability among elderly people in three UK districts. *Age and aging* 1997;26:203-10.
165. Trondheim kommune. Ressurser følger brukere i sykehjem. Trondheim; Desember 2006. (Report).
166. Counsell SR, Holder CM, Liebenauer LL, Palmer RM, Fortinsky RH et al. Effects of multicomponent intervention on functional outcomes and process of care in hospitalized older patients: a randomized controlled trial of Acute Care for Elders (ACE) in a community hospital. *J Am Geriatr Soc* 2000;48:1572-81.
167. Wieland D, Lamb VL, Sutton SR, Boland R, Clark M, Friedman S et al. Hospitalization in the Program of All-Inclusive Care for the Elderly (PACE): rates, concomitants, and predictors. *J Am Geriatr Soc* 2000;48:1373-80.
168. Steiner A. Intermediate care – a good thing? *Age and Aging* 2001;30-S3:33-39.
169. MacMahon D. Intermediate care – a challenge to specialty of geriatric medicine or its renaissance? *Age and Aging* 2001;30-S3:19-23.

170. Robinson T, White GL, Houchins JC. Improving Communication With Older Patients: Tips From the Literature. *Family Practice Management* 2006;13:73-8.
171. Clarke M, Clarke S, Jagger C. Social intervention and the elderly: a randomized controlled trial. *American Journal of Epidemiology* 1992; 136:1517-1523.
172. Coulter A. shifting the balance from secondary to primary care. Editorial. *BMJ* 1995;311:1447-1448
173. Campion EW. Specialized Care for Elderly Patients. *NEJM* 2002;346:874-5.
174. Jiwa M, Coleman M, McKinley RK. Measuring the quality of referral letters about patients with upper gastrointestinal symptoms. *Postgraduate Medical Journal*. 2005;81:467-469.
175. Core Electronic Health Record (CEHR). Utviklingsprosjekt i Trondheim kommune på oppdrag for SHdir (S@mspill2007).[In Norwegian].
[http://www.kith.no/templates/kith_WebPage_____2020.aspx] (05.05.2007),
176. Melis RJF, Rikkert MGMO, Parker SG, van Eijken MIJ. What is intermediate care? *BMJ* 2004;329:360-1.

10.0. Appendices

10.1 VAS for referral letters. Study I

VURDERING AV INNLEGGELSESSKRIV FOR PASIENT NR .

1. Formålet ved innleggelsen

Klart formulert problemstilling

1 2 3 4 5 6 7 8
dårlig *god*

Grunnlag for valg av avdeling på RiT

1 2 3 4 5 6 7 8
intet *god*

Grunnlag for valg av behandling/utredning

1 2 3 4 5 6 7 8
intet *god*

2. Tilstrekkelige opplysninger om somatiske forhold i innleggelsesskrivet

Sykehistorie

1 2 3 4 5 6 7 8
dårlig *god*

Aktuell situasjon

1 2 3 4 5 6 7 8
dårlig *god*

Symptomer

1 2 3 4 5 6 7 8
dårlig *god*

Funn

1 2 3 4 5 6 7 8

Supplerende undersøkelser

1 2 3 4 5 6 7 8
dårlig *god*

Faste medisiner

1 2 3 4 5 6 7 8
dårlig *god*

Funksjonsnivå

1 2 3 4 5 6 7 8
dårlig *god*

3. Tilstrekkelig informasjon om nettverk

Boforhold Ja Nei Ingen informasjon

Familie Ja Nei Ingen informasjon

Aktivitetsnivå Ja Nei Ingen informasjon

Omsorgstjenester Ja Nei Ingen informasjon

Angitt fastlege Ja Nei Ingen informasjon

10.2 VAS for discharge letters. Study I

VURDERING AV EPIKRISER MED EVT. BILAGSDOKUMENTER FOR PASIENT NR.

1. Formålet ved innleggelsen

Klart formulert problemstilling

1	2	3	4	5	6	7	8
<i>dårlig</i>							<i>god</i>

Prioritering av behandlingsstrategier

1	2	3	4	5	6	7	8
<i>dårlig</i>							<i>god</i>

Type behandling

1	2	3	4	5	6	7	8
<i>dårlig</i>							<i>god</i>

2. Tilstrekkelige opplysninger om somatiske forhold i innleggelsesskrivet

Sykehistorie

1	2	3	4	5	6	7	8
<i>dårlig</i>							<i>god</i>

Aktuell situasjon

1	2	3	4	5	6	7	8
<i>dårlig</i>							<i>god</i>

Symptomer

1	2	3	4	5	6	7	8
<i>dårlig</i>							<i>god</i>

Funn

1	2	3	4	5	6	7	8
<i>dårlig</i>							<i>god</i>

Supplerende undersøkelser

1	2	3	4	5	6	7	8
<i>dårlig</i>							<i>god</i>

Faste medisiner

1	2	3	4	5	6	7	8
<i>dårlig</i>							<i>god</i>

Omsorgsbehov

1	2	3	4	5	6	7	8
<i>dårlig</i>							<i>god</i>

3. Somatisk oppfølging av pasienten etter utskrivning

- | | |
|---|--|
| <input type="checkbox"/> Utskrivingsklar | <input type="checkbox"/> Ingen informasjon |
| <input type="checkbox"/> Av fastlege | <input type="checkbox"/> Ingen informasjon |
| <input type="checkbox"/> Poliklinikk | <input type="checkbox"/> Ingen informasjon |
| <input type="checkbox"/> Ny innleggelse | <input type="checkbox"/> Ingen informasjon |
| <input type="checkbox"/> Individuell plan | <input type="checkbox"/> Ingen informasjon |

4. Bosted etter innleggelse

10.3 Criteria for inclusion. Study II



Utvelgelseskriterier for pasienter som skal behandles ved intermediaerenheten ved Søbstad sykehjem

Pasientens navn:

Fødselsnr:

Adresse:

Overordnet kriterium.

En forutsetning for at pasienten skal behandles ved intermediaerenheten på Søbstad sykehjem, er at han er over 60 år og har en akutt forverring av en kronisk sykdom eller en nyoppstått sykdom med en funksjonssvikt som medfører at han med fordel kan behandles på Søbstad sykehjems intermediaeravdeling fremfor i en ordinær sykehusavdeling.

Følgende spørsmål skal vurderes på alle pasienter som er aktuelle for overføring

- | | | |
|--|----|-----|
| 1. Pasienten er 60 år eller eldre og er fra Trondheim | Ja | Nei |
| 2. Pasienten er ferdig utredet for den akutte sykdommen
som førte til innleggelse | Ja | Nei |
| 3. Pasienten kan høyst sannsynlig reise til eget hjem
etter endt behandling for aktuell lidelse | Ja | Nei |
| 4. Pasienten har <u>ikke</u> alvorlig grad av demens, forvirringstilstand
eller psykiatri som medfører omfattende oppfølging av lege,
sykepleier 24 timer i døgnet | Ja | Nei |

For pasienter som har behov for rehabilitering:

- | | | |
|---|----|-----|
| 5. Venter pasienten på et prioritert rehabiliteringstilbud? | Ja | Nei |
|---|----|-----|

For pasienter som ligger på ortopedisk avdeling:

- | | | |
|--|----|-----|
| 6. Har pasienten en sykdom som tilsier at han kan reise hjem i løpet av
14 dager etter overføring til intermediaerenheten | Ja | Nei |
|--|----|-----|

7. Hvis ja på spørsmål 1-4 og eventuelt også pkt 5 eller 6, kan pasienten overføres til videre behandling ved Søbstad sykehjem:

Ansvarshavende sykepleier ringer sykepleier ved intermediaærenheten Søbstad sykehjem telefon 72547889 eller 7254 8186 (avd.sykepleier Lisbeth Kystad) og avtaler overføring til intermediaærenheten i henhold til vedtatte prosedyrer.

Fylles ut bare for de pasienter som inkluderes i studien:

Hvis det er mindre enn 5 ledige plasser ved intermediaærenheten, vil aktuelle pasienter bli randomisert til enten fortsatt behandling ved St. Olavs Hospital eller til sluttbehandling ved Søbstad sykehjem, jfr. prosedyrene, jfr. pkt III i prosedyrene:

8. Pasienten randomiseres til fortsatt behandling ved St. Olav
9. Pasienten randomiseres til videre behandling ved intermediaærenheten

Trondheim, den03

postlege

Ansvarshavende sykepleier

Et eksemplar av dette skjemaet skal legges i pas. journal på St. Olav med kopi til legen på Søbstad.

Studienummer for pasienter inkludert i randomisert studie: _____

10.4 Procedures for including patients. Study II



Overføring av pasienter fra St. Olavs Hospital HF til intermediær avdeling ved Søbstad sykehjem

Utarbeidet ved: St. Olavs Hospital / Hjerte-lunge-senteret

Dokumentet angår: Sykepleier
Lege

Utarbeidet av: Jorunn Mediås

Gjelder for: Medisinsk avdeling, Hjertemedisinsk avdeling og Lungeavdelingen og ortopedisk avdeling

Godkjent av:
(signatur)

Helge Garåsen
Kommuneoverlege
Trondheim kommune

Rolf Windspoll
Senterdirektør
St.Olavs Hospital

Godkjenningsdato: 28.02.2003.

Hensikt

Kvalitetssikre overføring av pasienter fra St.Olavs Hospital HF til intermediær avdeling ved Søbstad sykehjem.

Omfang

Prosedyren omfatter pasienter som skal overføres til intermediære plasser ved Søbstad sykehjem.
Prosedyren gjelder ikke overflytting til ordinær sykehjemsplass.

Grunnlagsinformasjon

De eldre pasientene utgjør i dag de største og mest hjelpetrengende pasientgruppene både i primærhelsetjenesten og i sykehus. I følge SAMDATA 1999 utgjorde pasienter over 75 år 42% av belegget i medisinske avdelinger. Samtidig var 70% av alle innleggelser av pasienter over 79 år øyeblikkelig –hjelp innleggelser.

I perioder har Trondheim kommune hatt mange pasienter som venter på et kommunalt tilbud, liggende på St. Olavs Hospital.

St.Olavs Hospital har et pålegg fra Statens Helsetilsyn om å redusere antall korridorpasienter. En arbeidsgruppe bestående av fagpersoner fra RiT (nå St. Olavs Hospital) og Trondheim kommune har våren 2001 utredet mulighetene for ulike tiltak som kan avlaste både sykehuset og den kommunale helse- og omsorgstjenesten i overgangssituasjoner når pasienter skal innlegges og / eller utskrives fra sykehuset til kommunale tilbud. Et av satsningsområdene er etablering av en intermediær avdeling ved Søbstad sykehjem da arbeidsgruppen antar at mange kronikere med akutt forverring med fordel kan sluttbehandles i en spesielt tilpasset sykehjemsavdeling i stedet for i sykehuset.

Etter utskriving fra St.Olavs Hospital HF, har Trondheim kommune det faglige og administrative ansvar for pasienten.

Ingen pasienter skal betale for oppholdet ved intermediær avdeling ved Søbstad sykehjem, og Servicekontoret skal ikke involveres i vurderingen om pasienten fyller kriterier for overflytting til denne enheten.

Arbeidsbeskrivelse

Ansvar

Lege, avdelingssykepleier og sykepleier ved sengepost, St. Olavs Hospital, har i samhandling ansvar for at prosedyren gjennomføres.

Framgangsmåte

I: Vurdering av om pasienten fyller inklusjonskriteriene.

Behandlerne lege og sykepleier ved St. Olavs Hospital gjør en medisinsk og sykepleiefaglig vurdering om intermediær avdeling ved Søbstad sykehjem er rette behandlings – og omsorgsnivå for den enkelte pasient i henhold til vedlagte kriterier.

II. Ved overføring til Intermediær avdeling ved Søbstad sykehjem skal følgende fremgangsmåte benyttes:

1: Lege og sykepleier ved sengeposten har ansvar for å gi pasient og pårørende muntlig og skriftlig informasjon om tilbudet ved intermediær avdeling ved Søbstad sykehjem

2: Avdelingen tar kontakt med avdelingssykepleier Lisbeth Kystad, intermediær avdeling ved Søbstad sykehjem, for å høre om det er ledig plass, og melder pasienten dit. Tlf. 72 54 81 86.

Henvendelse om overflytting til intermediær avdeling, Søbstad sykehjem, skal i prøveperioden skje i tidsrommet mandag – fredag mellom kl. 0800 – kl.15.00.

3: Sykepleier ved sengeposten gjør avtale med sykehjemmet om tidspunkt for overflytting.

Transport bestilles fra sengeposten ved St. Olavs Hospital.

Behov for følge av sykepleier / hjelpepleier vurderes i hvert enkelt tilfelle.

4: Epikrise og sykepleierrapport skal følge pasienten. Kopi av relevante dokumenter medsendes (eks. kurve, lab. ark).

Etter overflytting

Epikriseskrivende eller kontrasierende lege ved St.Olavs Hospital er ansvarlig for at evt. spørsmål fra tilsynslegen ved intermediaær avdeling, Søbstad sykehjem, blir besvart.

Avdelingssykepleier ved St.Olavs Hospital er ansvarlig for at evt. spørsmål fra sykepleier ved intermediaær avdeling, Søbstad sykehjem, blir besvart.

10.5 Information letter to the patients. Study II



Til deg som er pasient

Informasjon om intermediaærenheten på Søbstad sykehjem og forespørsel om å delta i en studie som skal vurdere nytten av behandlingstilbudet.

St.Olavs Hospital og Trondheim kommune har i fellesskap opprettet en avdeling på 20 senger på Søbstad sykehjem. På denne avdelingen skal enkelte pasienter få sin sluttbehandling for sin sykdom i stedet for på sykehuset.

St.Olavs Hospital og Trondheim kommune mener at en del pasienter med fordel kan sluttbehandles på Søbstad sykehjem. Forutsetningen for å komme i betraktning for overføring til Søbstad, er at pasienten er over 60 år, er fra Trondheim kommune, og at alle nødvendige sykehusundersøkelser er gjennomført.

For å sikre at kvaliteten på tilbudet ved Søbstad sykehjem er godt, har alle ansatte i tillegg til sin vanlige grunnutdanning, gjennomgått en grundig opplæring om de behandlingstilbud som vil bli gitt. I tillegg er det vesentlig flere sykepleiere og annet helsepersonell på Søbstad enn ved ordinære sykehjem. Det er også et fortløpende og nært samarbeid mellom personellet på Søbstad og på sykehuset.

Vi ønsker også å undersøke om det er noen forskjell på om du får din sluttbehandling ved St.Olavs Hospital sammenlignet med intermediaærenheten på Søbstad. For enkelte pasienter, som fyller vilkårene for overflytting til Søbstad, vil det derfor bli foretatt en loddtrekning som avgjør om du skal få din sluttbehandling på intermediaærenheten ved Søbstad sykehjem eller på sykehuset.

Vi ber derfor om at du samtykker i at vi kan få tilgang til opplysninger om din sykdom i din journal på St.Olav og på Søbstad. All informasjon som blir brukt utenfor Søbstad og sykehuset vil bli brukt slik at det ikke vil bli mulig å spore noen opplysninger tilbake til deg som person.

Du har full anledning til å reservere deg mot å være med på studien, og du kan når som helst senere trekke deg fra deltagelse i studien uten at du behøver å angi noen grunn.

Du kan stille flere spørsmål om intermediaærenheten til personellet ved posten du ligger på eller til kommuneoverlege Helge Garåsen på telefon 91112656.

Trondheim, 03.07.2003

Rolf Windspoll
Samhandlingssjef
St.Olavs Hospital

Helge Garåsen
kommuneoverlege
Trondheim kommune

10.6 Consent formula. Study II



SAMTYKKESKJEMA

Jeg har lest informasjonskrivet om intermedieærenheten på Søbstad og om studien som skal vurdere kvaliteten på behandlingstilbudet.


Jeg gir herved mitt samtykke til å delta i studien, og at journalopplysninger om meg blir benyttet til å vurdere kvaliteten av behandlingen mens jeg deltar i studien.

Trondheim,

pasientens underskrift

NB: Samtykket legges i pasientens journal på St.Olavs Hospital med kopi til Søbstad sykehjem.

10.7 CONSORT Checklist Study I

of items to include when reporting a randomized trial. Manus submitted to BMC Public Health 

PAPER SECTION And topic	Item	Description	Reported on Page #
<i>TITLE & ABSTRACT</i>	1	How participants were allocated to interventions (e.g., "random allocation", "randomized", or "randomly assigned").	1
<i>INTRODUCTION</i> Background	2	Scientific background and explanation of rationale.	3
<i>METHODS</i> Participants	3	Eligibility criteria for participants and the settings and locations where the data were collected.	4-,5,6
Interventions	4	Precise details of the interventions intended for each group and how and when they were actually administered.	5
Objectives	5	Specific objectives and hypotheses.	4
Outcomes	6	Clearly defined primary and secondary outcome measures and, when applicable, any methods used to enhance the quality of measurements (e.g., multiple observations, training of assessors).	4
Sample size	7	How sample size was determined and, when applicable, explanation of any interim analyses and stopping rules.	7
Randomization -- Sequence generation	8	Method used to generate the random allocation sequence, including details of any restrictions (e.g., blocking, stratification)	6
Randomization -- Allocation concealment	9	Method used to implement the random allocation sequence (e.g., numbered containers or central telephone), clarifying whether the sequence was concealed until interventions were assigned.	6
Randomization -- Implementation	10	Who generated the allocation sequence, who enrolled participants, and who assigned participants to their groups.	6
Blinding (masking)	11	Whether or not participants, those administering the interventions, and those assessing the outcomes were blinded to group assignment. If done, how the success of blinding was evaluated.	6
Statistical methods	12	Statistical methods used to compare groups for primary outcome(s); Methods for additional analyses, such as subgroup analyses and adjusted analyses.	7
RESULTS Participant flow	13	Flow of participants through each stage (a diagram is strongly recommended). Specifically, for each group report the numbers of participants randomly assigned, receiving intended treatment, completing the study protocol, and analyzed for the primary outcome. Describe protocol deviations from study as planned, together with reasons.	21

Recruitment	14	Dates defining the periods of recruitment and follow-up.	7
Baseline data	15	Baseline demographic and clinical characteristics of each group.	17
Numbers analyzed	16	Number of participants (denominator) in each group included in each analysis and whether the analysis was by "intention-to-treat". State the results in absolute numbers when feasible (e.g., 10/20, not 50%).	7,8,17
Outcomes and estimation	17	For each primary and secondary outcome, a summary of results for each group, and the estimated effect size and its precision (e.g., 95% confidence interval).	7-10, 18-20
Ancillary analyses	18	Address multiplicity by reporting any other analyses performed , including subgroup analyses and adjusted analyses, indicating those pre-specified and those exploratory.	7
Adverse events	19	All important adverse events or side effects in each intervention group.	7
DISCUSSION Interpretation	20	Interpretation of the results , taking into account study hypotheses, sources of potential bias or imprecision and the dangers associated with multiplicity of analyses and outcomes.	10-12
Generalizability	21	Generalizability (external validity) of the trial findings.	11
Overall evidence	22	General interpretation of the results in the context of current evidence.	12

10.8 Patient consumer survey 2004. Intermediate Department Søbstad Nursing Home

Spørreskjema
Undersøkelse blant brukere på Intermediæravdelingen ved Søbstad sykehjem

Instruksjoner for utfylling:

Før utfylling ber vi deg legge merke til følgende:

- Det skal ikke føres navn på skjemaet
- Skjemaet leveres slik: Utfylt skjema legges i svarkonvolutt og leveres til personalet på avdelingen. De sender det videre til Vurderingstjenesten.

Opplysninger om bruker:

Brukers alder:år

Kjønn: Mann: Kvinne:

Sett ett kryss for hvert spørsmål

Informasjon

- | | Ja | Nei | Vet ikke |
|---|--------------------------|--------------------------|--------------------------|
| 1. Fikk du skriftlig informasjon om Søbstad sykehjem mens du var pasient på St. Olavs Hospital? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Får du fortløpende informasjon om endringer som skjer på sykehjemmet?... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Vet du hvem som er din kontaktperson på sykehjemmet? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Døgnrytme

- | | Ja | Av og til | Nei | Vet ikke |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 4. Følger du din vanlige døgnrytme når du er på sykehjemmet? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Kan du selv velge når du ønsker å spise?..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Personlig hygiene

- | | Ja | Av og til | Nei | Vet ikke |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 6. Får du den hjelpen du trenger for å holde deg velstelt? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Får du badet/dusjet når du har behov? .. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Får du hjelp til toalettbesøk etter behov? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Ernæring og spisesituasjon

- | | Ja | Av og til | Nei | Vet ikke |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 9. Er maten du får appetittvekkende? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Får du nok mat i løpet av døgnet? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Kan du selv velge hva du ønsker å spise til middag? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Kan du bestemme hvem du vil spise sammen med? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Brukermedvirkning

- | | Ja | Av og til | Nei | Vet ikke |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 13. Får du være med å bestemme hvilken hjelp du vil ha? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Opplever du at forhold som du ikke er fornøyd med blir tatt hensyn til? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Blir du behandlet med respekt og høflighet? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Trygghet

- | | Ja | Av og til | Nei | Vet ikke |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 16. Får du den oppmerksomheten du har behov for fra personalet? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Har du mulighet til å tilkalle hjelp til enhver tid? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Får du hjelp innen 5 minutter etter tilkalling? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Føler du deg trygg på at du får legehjelp dersom du har behov for det? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Utfylt spørreskjema legges i svarkonvolutt og leveres personalet i avdelingen.

10.9 Basic information about Gerix and IPLOS

IPLOS – Individbasert PLeie og OmsorgsStatistikk

IPLOS er systematisert standardinformasjon basert på individopplysninger om søkere og mottakere av kommunale sosial- og helsetjenester. Et obligatorisk verktøy for dokumentasjon, rapportering og statistikk for kommunene og sentrale myndigheter.

Tjenester som omfattes av IPLOS er kommunale sosial- og helsetjenester som ytes av kommunen i hjemmet og i kommunal institusjon, uavhengig av alder og diagnose.

Det skal være innført i alle landets kommuner innen utgangen av 2005.

Tjenester som ikke omfattes av IPLOS er :

- barnevern
- helsestasjon/skolehelsetjeneste
- legetjeneste
- økonomisk veiledning/bistand

Overordnet gjennomgang av hovedområder :

- opplysninger om person og boligsituasjon, 9 variabler
- opplysninger om vurdert av helsepersonell, 2 variabler
- opplysninger om funksjonsevne, 17 variabler
- opplysninger om relevant(e) diagnose(r)
- opplysninger om kommunale tjenester, 21 variabler
- opplysninger om ikke-kommunale døgntilbud
- opplysninger om IP – individuell plan

Til sammen **52** variabler. Gerix hadde til sammenligning 94 variabler

Utfordringer i Trondheim kommune.

Funksjonsnivå (ADL/psykososiale forhold, tilpasset ICF)

<u>Gerix, verdi 1 - 4</u>		<u>IPLOS, verdi 1 – 5</u>	
Verdi 1: Kan utføre aktiviteten alene, uten hjelpemidler. Ikke personhjelp Verdi 2: Kan utføre aktiviteten alene m/tilrettelegging og eller tilsyn, eksempelvis hjelpemidler Verdi 3: Kan delvis utføre aktiviteten alene, men er avhengig av personhjelp/delhjelp Verdi 4: Kan ikke utføre aktiviteten. Helt avhengig av hjelp		Verdi 1: Ingen problemer (kan bruke hjelpemidler) Verdi 2: Noe problemer. Utfører/klarar selv men med endret standard. Det gis ikke tjenester, men dette kan være en person som kan trenge det i nær fremtid Verdi 3: Middels problemer. Utfører/klarar deler selv, men må ha personbistand til resten. Tjenesteyter kan evt. gå til/fra. Verdi 4: Store problemer. Klarer noe selv, men tjenesteyter tilstede hele tiden. Verdi 5: Klarer ikke. Utfører ikke noe selv.	
1	Innendørs mobilitet Å komme seg rundt innendørs. Hjemme	1	Bevege seg innendørs Om personen forflytter seg på et plan

	eller andre steder der personen vanligvis ferdes.		innendørs. Beveger seg på flatt gulv, over terskler, ut og inn av seng, opp og ned av stol
2	Utendørs mobilitet Å bevege seg utendørs der personen vanligvis ferdes, til fots eller ved hjelp av transportmidler, for å få utført ønskelige og nødvendige gjøremål.	2	Bevege seg utendørs Om personen forflytter seg utenfor egen bolig (med egen bolig menes her utenfor egen inngangsdør. Trappeoppganger og trapper er utendørs)
3	Personlig hygiene Å ivareta personlig vask og stell	3	Vaske seg Om personen vasker, tørker og stiller hele kroppen. Bruker vann og passende midler og metoder.
4	Av/påkledning Å ta på seg dagligklær til inne og utebruk	4	Kle på og av seg Om personen tar på og av seg klær og fottøy i rekkefølge og i overensstemmelse med klimatiske og sosiale forhold
5	Toalett Å komme seg på toalettet, tørke seg, ta av/på klær i forbindelse med toalettbesøk. Evne til å sørge for tilfredsstillende hygiene.	5	Gå på toalett Om personen planlegger og utfører; tømning av tarm, blære og intimhygiene ved menstruasjon, tørker seg nedentil og vasker hender.
6	Spising Å ta til seg mat og drikke, herunder tilrettelegge for spisesituasjonen	6	Spise Om personen spiser servert mat på en kulturell akseptabel måte. Fører mat og drikke til munnen og svelger.
7	Innkjøp Å sørge for dagligvarer, planlegging og utførelse	7	Skaffe seg varer og tjenester Om personen skaffer seg mat/drikke, klær/sko, husholdningsartikler og tjenester som er nødvendig i dagliglivet.
8	Matlaging Å planlegge og gjennomføre tilberedning av måltider	8	Lage mat Om personen planlegger, organiserer og tilbereder enkle og sammensatte måltider. Lager tørrmat, varmer opp mat og lager kaffe og te.
9	Rengjøring Å utføre dagligdags renhold av egen bolig og klær	9	Alminnelig husarbeid Om personen utfører vanlig husarbeid som å gjøre huset rent, vaske klær, bruke husholdningsapparater, lage matvarer og kaste avfall.
10	Medisinsk egenomsorg Å ta ansvar for egen sykdom, og håndtere medisiner/hjelpemidler, dietter, skifte på sår/stomi, håndtere proteser, unngå smitte, tilkalle medisinsk hjelp hvis nødvendig.	10	Ivareta egen helsetilstand Om personen mestrer egen sykdom, skade eller funksjonshemming. Tar kontakt med behandlingsapparatet når symptomer og skade oppstår, følger behandlingsopplegg, håndterer egne medisiner og hjelpemidler (eks. støttestrømper, høreapparat, sonde).
11	Orienteringsevne Å finne frem i kjente og ukjente	11	Hukommelse Om personen husker nylig inntrufne

	omgivelser, orientere seg om tid, sted og gjenkjenne personer. Hukommelse og konsentrasjon		hendelser. Er orientert for tid og sted, gjenkjenner kjente personer, husker avtaler og viktige hendelser den siste uken.
12	Oppfatning egen situasjon Grad av realistisk innsikt i egen situasjon, muligheter og begrensninger. F. eks. vedrørende oppfatning av muligheter til å endre situasjon, sammenheng mellom egen livsførsel og helse, virkning av hjelpetiltak, trening og hjelpemidler.		<i>Ikke omtalt i IPLOS.</i>
13	Trygghet Brukerens opplevelse av trygghet i egen hverdag. Evne til å mestre bosituasjon og daglige behov, gå ut alene, oppsøke nye plasser, reise osv. Trygghet i forhold til nye mennesker og situasjoner.		<i>Ikke omtalt i IPLOS.</i>
14	Sosial kontaktevne Evne til å komme i kontakt med andre, ha omgang med sine omgivelser og familie/pårørende i samsvar med begge parters ønske og behov, skape og opprettholde et sosialt nettverk.	12	Fungere sosialt Om personen skaper, opprettholder et sosialt nettverk og tar kontakt med familie, venner, kollegaer og personer i nærmiljøet.
15	Initiativevne Evne til, på eget initiativ, å ordne opp i egne saker, etter behov, pågangsmot og generell motivasjon til å gjennomføre oppgavene.		<i>Ikke omtalt i IPLOS.</i>
16	Ansvar for egen hverdag Evne til å sørge for tilfredsstillende kosthold, organisere tid og gjøremål, administrere egen bolig og økonomi, evne til å ta de nødvendige initiativ for å skaffe seg hjelp.	13	Ta daglige beslutninger Om personen organiserer daglige gjøremål, disponerer tiden gjøremålene tar, planlegger rekkefølgen da skal gjennomføres i, og integrerer uforutsette hendelser.
17	Kommunikasjonsevne Snakke, skrive, forstå, bruke radio/TV, telefon, trygghetsalarm	14	Kommunikasjon Om personen evner å kommuniserer med andre personer. Forstår og uttrykker seg verbalt/nonverbalt.
	<i>Ikke omtalt i Gerix.</i>	15	Styre egen adferd Om personen opprettholder og mestere interaksjon med andre mennesker, og handler i overensstemmelse med sosiale regler og sedvaner. Behersker verbal og fysisk aggresjon og ukritisk væremåte overfor seg selv og andre.
	<i>Ikke med i pleietyngdegrunlaget i Gerix.</i>	16	Syn Om personen med tilstrekkelig belysning ser skriftspråk/symboler/tall, ser på TV, synsorienterer seg i eget hjem og

			kjente/ukjente omgivelser.
	<i>Ikke med i pleietyngdegrunnlaget i Gerix.</i>	17	Hørsel Om personen hører en vanlig tale en til en, og i gruppe. Hører tale i telefon og hører ringeklokke.

Konklusjon: Det vil være umulig å konvertere Gerix registreringer automatisk til IPLOS. Dvs. at alle ADL – registreringer må gjøres manuelt på alle brukere. Pr. i dag dreier dette seg om et antall på ca. 8800.

Den innbyrdes vektingen (som gir den endelige pleietyngden) i Gerix er:

1	Personlig hygiene	0.0755	I IPLOS er alle vektet likt, dvs. ingen innbyrdes vekting.
2	Ansvar egen hverdag	0.0743	
3	Av/påkledning	0.0704	
4	Initiativevne	0.0690	
5	Toalett	0.0674	
6	Medisinsk funksjon	0.0670	
7	Matlaging	0.0658	
8	Orienteringsevne	0.0645	
9	Kommunikasjonsevne	0.0587	
10	Spising	0.0581	
11	Oppfatning egen situasjon	0.0554	
12	Innendørs mobilitet	0.0523	
13	Trygghet	0.0502	
14	Utendørs mobilitet	0.0488	
15	Innkjøp	0.0486	
16	Sosial kontaktevne	0.0473	
17	Rengjøring	0.0267	
	Sum	1.000	

Årsaken til at det ikke er vektig på IPLOS – data er begrunnet med for dårlig tallmateriale så langt (ca. 30 prøvekommuner har vært med fra 01.04.02 – 01.09.03.)

Kommunale tjenester.

Det er et krav at vi må kunne beholde dagens tjenester/vedtak (til høyre i tabellen). Det betyr samtidig at vi må koble disse bak i kodeverket til riktig tjenestetypen i IPLOS (venstre side i tabellen).

	Tjenester IPLOS	Lov om sosiale tjenester	Tjenester Gerica
30	Praktisk bistand: daglige gjøremål	Vedtak fattet etter Lov om sosiale tjenester § 4 - 2, pkt. a, jmf. § 4 -3	Praktisk bistand hushold (11) Praktisk bistand hushold 2 (31) Praktisk bistand person (13) Husmorvikar (7) Nattpatrulje (26)
31	Praktisk bistand –	Vedtak fattet etter Lov om sosiale	

	Tjenester IPLOS	Lov om sosiale tjenester	Tjenester Gerica
	oppl�ring: daglige gj�rem�l	tjenester � 4 - 2, pkt. a, jmf. � 4 -3	
32	Praktisk bistand: brukerstyrt personlig assistent	Vedtak fattet etter Lov om sosiale tjenester � 4 - 2, pkt. a, jmf. � 4 -3. Rundskriv I-20/2000	Brukerstyrt Personlig Assistent (22)
33	Praktisk bistand: dagsenter	Vedtak eller beslutning fattet etter Lov om sosiale tjenester � 4 - 2, pkt. a, jmf. � 4 -3. Form�let med dagsenter kan v�re hjelp til egenomsorg, sosial st�tte, aktivisering og oppl�ring i dagliglivets gj�rem�l og lignende.	Dagtilbud kommunal (9)
34	Praktisk bistand: matombringning	Vedtak fattet etter Lov om sosiale tjenester � 4 - 2, pkt. a, jmf. � 4 -3	Middagsombringning (8)
35	Praktisk bistand: trygghetsalarm	Vedtak fattet etter Lov om sosiale tjenester � 4 - 2, pkt. a, jmf. � 4 -3	Trygghetsalarm (2)
36	Avlastning – utenfor institusjon	Vedtak fattet etter Lov om sosiale tjenester � 4 - 2, pkt. b, jmf. � 4 -3	Avlastning privat (34)
37	Avlastning – i institusjon	Vedtak fattet etter Lov om sosiale tjenester � 4 - 2, pkt. b, jmf. � 4 -3. For hva som her skal regnes som institusjon vises det til Lov om sosiale tjenester � 7-12, med forskrift	Avlastningsopphold (14) Trygghetsopphold (1)
38	St�ttekontakt	Vedtak fattet etter Lov om sosiale tjenester � 4 - 2, pkt. c, jmf. � 4 -3	Tilrettelagt fritid (32)
39	Institusjon eller bolig med held�gns omsorgstjenester	Vedtak fattet etter Lov om sosiale tjenester � 4 - 2, pkt. d, jmf. � 4 -3. Aldershjem. Bolig for barn/unge under 18 �r, herunder avlastningsbolig. Privat forpleining	
40	Omsorgsl�nn	Vedtak fattet etter Lov om sosiale tjenester � 4 - 2, pkt. e, i f�lge retningslinjer i rundskriv I – 42/1998	Omsorgsl�nn (21)
41	Omsorgsbolig	Bygget med oppstartstilskudd fra Husbanken jfr. <i>Handlingsplanen for eldreomsorgen</i> , og <i>Opptappingsplanen for psykisk helse</i> . Beslutning eller vedtak om tildeling. Vedtak fattes i henhold til lov om sosiale tjenester, � 3 – 4	HDO i omsorgsbolig (20)
42	Annen bolig	Bolig som kommunen disponerer for pleie- og omsorgsform�l, som ikke er institusjon eller omsorgsbolig. Beslutning eller vedtak om tildeling. Vedtak fattes i henhold til lov om sosiale tjenester, � 3 – 4	
43	Tvang i systematiske tiltak	Vedtak fattet etter Lov om sosiale tjenester	Skadeavvergende tiltak (23)
			Dagopphold rehabilitering (10)

	Tjenester IPLOS	Lov om sosiale tjenester	Tjenester Gerica
	Ikke funnet plass til/vet ikke..		Tjeneste kjøpt (24) Henvendelse (25) Dagtilbud privat (29) Ambulerende dagsenter (30)

	Tjenester IPLOS	Lov om helsetjeneste i kommunene	Tjenester Gerica
44	Pleie- og omsorg utenfor institusjon	Vedtak fattet etter Lov om helsetjenesten i kommunen § 1 – 3, jfr. § 2 – 1. Med pleie- og omsorg menes her hjemmesykepleie, samt evt. beslutning eller vedtak om psykisk helsetjeneste i kommunen. Jfr. veileder i saksbehandling og dokumentasjon for pleie- og omsorgstjenestene, side 43, andre avsnitt	Hjemmesykepleie (12) Oppfølging/tiltak (33)
45	Rehabilitering utenfor institusjon	Beslutning eller vedtak om tjeneste i henhold til Lov om helsetjenesten i kommunen, § 1 – 3. Forskrift om rehabilitering og Forskrift om individuelle planer. Omfatter også tilpasning og utredning av hjelpemiddel behov.	Ergoterapi (3) Fysioterapi (4) Oppsøkende rehabilitering (6) Individuell plan (28)
46	Dagopphold	Vedtak fattet etter Lov om helsetjenesten i kommunen § 1 – 3, jfr. § 2 – 1. Forskrift for sykehjem og boform for heldøgns omsorg og pleie § 2 – 1, pkt. g	Dagtilbud kommunal (9)
47	Tidsbegrenset opphold i institusjon – utredning/behandling	Vedtak fattet etter Lov om helsetjenesten i kommunen § 1 – 3, jfr. § 2 – 1. Hovedhensikten med oppholdet er utredning eller diagnostisering	Korttidsopphold 1 (15) Korttidsopphold 2 (17) Intermediæropphold (27) Akutt plass (16)
48	Tidsbegrenset opphold i institusjon – rehabilitering	Vedtak fattet etter Lov om helsetjenesten i kommunen § 1 – 3, jfr. § 2 – 1. Hovedhensikten med oppholdet er rehabilitering. Gjelder kommunal institusjon	Rehab. opphold døgn (18)
49	Tidsbegrenset opphold i institusjon – annet	Vedtak fattet etter Lov om helsetjenesten i kommunen § 1 – 3, jfr. § 2 – 1. Alle midlertidige opphold der hovedhensikten verken er avlastning, utredning, behandling eller rehabilitering. Gjelder ikke trygghetsopphold.	
50	Langtidsopphold i institusjon	Vedtak fattet etter Lov om helsetjenesten i kommunen § 1 – 3,	HDO i sykehjem (19)

	Tjenester IPLOS	Lov om helsetjeneste i kommunene	Tjenester Gerica
		jfr. § 2 – 1	

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11.0 Original papers I-IV

Paper I

Research article

Open Access

The quality of communication about older patients between hospital physicians and general practitioners: a panel study assessment

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Abstract

Background: Optimal care of patients is dependent on good professional interaction between general practitioners and general hospital physicians. In Norway this is mainly based upon referral and discharge letters. The main objectives of this study were to assess the quality of the written communication between physicians and to estimate the number of patients that could have been treated at primary care level instead of at a general hospital.

Methods: This study comprised referral and discharge letters for 100 patients above 75 years of age admitted to orthopaedic, pulmonary and cardiological departments at the city general hospital in Trondheim, Norway. The assessments were done using a Delphi technique with two expert panels, each with one general hospital specialist, one general practitioner and one public health nurse using a standardised evaluation protocol with a visual analogue scale (VAS). The panels assessed the quality of the description of the patient's actual medical condition, former medical history, signs, medication, Activity of Daily Living (ADL), social network, need of home care and the benefit of general hospital care.

Results: While information in the referral letters on actual medical situation, medical history, symptoms, signs and medications was assessed to be of high quality in 84%, 39%, 56%, 56% and 39%, respectively, the corresponding information assessed to be of high quality in discharge letters was for actual medical situation 96%, medical history 92%, symptoms 60%, signs 55% and medications 82%. Only half of the discharge letters had satisfactory information on ADL. Some two-thirds of the patients were assessed to have had large health benefits from the general hospital care in question. One of six patients could have been treated without a general hospital admission. The specialists assessed that 77% of the patients had had a large benefit from the general hospital care; however, the general practitioners assessment was only 59%. One of four of the discharge letters did not describe who was responsible for follow-up care.

Conclusion: In this study from one general hospital both referral and discharge letters were missing vital medical information, and referral letters to such an extent that it might represent a health hazard for older patients. There was also low consensus between health professionals at primary and secondary level of what was high benefit of care for older patients at a general hospital.

Background

The effectiveness and quality of care for older patients is largely dependent on the content of the written communication between physicians; i.e. referral and discharge letters. There is consensus between clinicians on the content of the referral [1] and discharge letters [2].

Still, national and international studies show an insufficient quality in the written communication about patients' medical situation and in the transferral of duties and obligations from one responsible person or medical team to another [3-16]. Studies have shown that initial short reports [12,13], joint charts [14], electronic interactive referrals [15] or structured communication formulas [16] have not, or have only partly, improved the quality of communication between physicians.

Fatal adverse drug events have become a major hospital problem, especially for older patients with multiple diseases and a high number of administered drugs [6,17,18].

Health care provision in Norway is based on a decentralised model. The municipalities (primary health care) are responsible for home care services, nursing homes, community hospitals, family physicians, health services for mothers, children and youth, midwives, physiotherapists, occupational therapists and emergency services provided by general practitioners on duty. The government (secondary health care) owns and runs district general hospitals, university hospitals and ambulance services throughout the regional health authorities (five regions). Professional collaboration between physicians in primary health care and secondary health care is mainly based on written communication in the form of referral and discharge letters. Direct contact, by telephone or in meetings, occurs only in special incidents.

Since 2002 one of the official Norwegian health quality criteria is the quality of the discharge letters. However, the quality of the discharge letters in Norway in 2007 still remains modest [19].

The main objectives of the present study were to assess the quality of written communication about older patients between physicians and to estimate the number of patients that could have been treated at primary level instead of at a general hospital by using a Delphi technique with two expert panels comprising hospital physicians, general practitioners and public health nurses.

Methods

Setting

During a three week period in February 2002 100 referral and discharge letters, both acute and elective, were

included consecutively. The city general hospital in Trondheim, St.Olavs University Hospital, is both a general hospital for the municipality of Trondheim and a university hospital for the three counties in Mid-Norway. In this study only patients being admitted to the general hospital were included.

The study population was patients 75 years of age or older admitted to the orthopaedic (n = 30), pulmonary (n = 30) and cardiological (n = 40) departments from the municipalities of Trondheim and Malvik. There were no exclusion criteria. Secretaries at the general hospital collected copies of all referral and discharge letters for the included patients when discharge letters were signed. Neither the general practitioners nor the general hospital physicians knew which patients were included in the study, as the time for inclusion was unknown to the physicians.

Study design

Two expert panels were recruited. Each panel consisted of one general hospital physician (geriatrician), one general practitioner and one public health nurse. All of the panel members were certified specialists in their respective fields. None of them had any affiliation with the departments involved in the study.

The panels used a standardised evaluation protocol with a visual analogue scale (VAS). The panels assessed the quality of the written information concerning the patients' actual situation, former medical history, symptoms, signs, medication, social network, activity of daily living (ADL), need of care and responsibility for follow-up care. The information was judged as to whether it was sufficient or not according to the patients presented problems or diagnoses. The panels also assessed the level of benefit gained by general hospital care and if the patients could be treated outside the general hospital; at a nursing home, community hospital, a rehabilitation department, an out-patient department at the general hospital, by public home care services or by a general practitioner. The aim was to estimate the number of patients that could have been treated without admission to the general hospital.

Before this study began, a pilot study of five referral letters was carried out where the expert panels examined, discussed and tested the evaluation protocol thoroughly in two meetings.

In the study twenty-five referral and discharge letters were evaluated by both panels; 15 from cardiological, five from pulmonary and five from orthopaedic departments. The rest of the referral and discharge letters were assessed by only one of the expert panels.

Each panel member examined copies of the referral and discharge letters individually. Consensus was defined to exist only if the difference between the group members did not exceed two on the VAS scale. If this criterion was met, the panel's evaluation was defined as the median of the three group members. Otherwise, the case was discussed in a meeting, using the Delphi technique [20], with all the participants of the panel. This methodology was also used for cases evaluated by both panels. To show the level of consensus between the panels the 25 referral and discharge letters evaluated by both panels are presented separately. The panels' assessments, as well as each expert's, were recorded for each referral and discharge letter.

All data was blinded with respect of the patients' identity (name, birthday and address), the name of the departments at the general hospital and the names of the physicians.

The Regional Committee for Medical Research Ethics for Central Norway approved the study. The study was granted license by the Norwegian Data Inspectorate and all data was processed in anonymous form.

Statistical methods

To investigate the structure of the consensus between the participants in each panel and between the panels it was decided, during the assessments in the pilot study, to divide the assessments into three categories; low (1-3), intermediate (4,5) and high (6-8), and the results were tabulated against each other in contingency tables.

We undertook all analysis using SPSS version 14.0 for Windows and Excel version 2003. Differences between the departments were tested by chi square tests. Statistical significance was set at p = 0.05.

Data was collected, on all assessments of the 25 cases assessed by both panels, for interrater and test reliability analyses. Agreement between the panels and within each panel was estimated as observed and proportional agreement together with kappa statistics [21,22]. Strength of

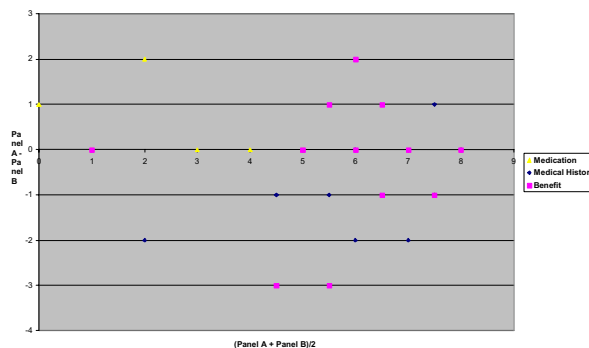


Figure 1
The difference between the mean score of the quality of information on medication, medical history and the benefit of general hospital care from Panel A and Panel B according to the assessed quality. Bland and Altman diagram.

consensus (value of κ) was defined as: very good (0.81 – 1.00), good (0.61 – 0.80), moderate (0.41 – 0.60), fair (0.21 – 0.40) and poor (below 0.20). The distribution of concordance was also analysed with a Bland-Altman diagram (Figure 1) [23].

Results

Referral letters

None of the patients were referred from the same physician. The patients' usual general practitioner referred 19 patients, 44 by general practitioners on emergency care duty, 23 by ambulance personnel, and for 14 patients the signature of the referring physician was unreadable. The description of the actual medical situation leading to the referral was denoted to be of high quality in 84%, of former medical history in 39%, of symptoms in 56%, of signs in 56% and of medication in 39% of the cases (Table

Table 1: Assessments (with 95% Confidence Intervals) of the quality of the referral letters (N = 100)

	Low	Intermediate	High	Mean score
Actual situation	14 (8–22)	2	84 (75–91)	6.90 (6.65–7.14)
Former medical history	44 (34–54)	17	39 (29–49)	4.67 (4.17–5.17)
Symptoms	26 (18–36)	18	56 (46–66)	5.75 (5.41–6.13)
Signs	26 (18–36)	18	56 (46–66)	5.98 (5.61–6.34)
Medication	44 (34–54)	17	39 (29–49)	3.20 (2.53–3.87)
ADL	55 (45–65)	23	22 (14–31)	3.68 (3.24–4.12)
Social network	92 (85–97)	0	8 (4–15)	1.10 (1.03–1.16)
Need of care	88 (80–94)	0	12 (6–20)	1.14 (1.07–1.22)

1). Descriptions of the patients' social network and need for home care were assessed to be of low quality in 92% and 88% of the referral letters.

The quality of the referral letters were assessed to be insufficient independent of who referred the patients; general practitioners, emergency personals or physicians at outpatient departments.

Discharge letters

The discharge letters were written by 94 different physicians. Information about the actual medical situation was assessed to be of high quality in 96%, of medical history in 92%, of symptoms in 60%, of signs in 55%, of medication in 82% and of ADL in 50% of the discharge letters (Table 2). However, the descriptions of social network (20%) and the need for home care (31%) were denoted to be of high quality in fewer cases (Table 2).

As much as 20% of discharge letters were missing vital medical information and almost none described ADL or patients' need for home care services.

Benefit of general hospital care

The assessments showed that the specialists meant that general hospital care had a large beneficial value for 77% of the patients, nurses scored 71% and general practitioners 59%. The score for all the panellists combined was 70% (Table 3). Consensus regarding benefit of the admissions was fair between the panels, but varied from poor to good within the panels and between the professions; with a much higher degree of consensus between the specialists ($\kappa = 0.64$) than the other professions. Within the panels there was an especially large disagreement as to the benefit of general hospital care between the specialist and the general practitioner in one of the panels (B) ($\kappa = 0.04$).

In the present study there were no statistically significant associations between the quality of the referral and discharge letters and the assessments of the benefit of the general hospital care, except for ADL. A good description of ADL, however, was strongly associated with a high benefit of general hospital care ($p < 0.001$).

Follow-up responsibility after discharge

Some one of four discharge letters had no information as to who was responsible for follow-up care. Fifty-three of the patients were to be followed-up by general practitioners, 17 at outpatient departments at the general hospital, two at a nursing home, 28 needed public home care services and 23 discharge letters had no information about follow-up responsibility.

Where could patients have been treated instead of being admitted to the general hospital

There was consensus within the expert panels that several patients could have been treated without a general hospital admission. Three of the patients could have received sufficient care from general practitioners, five by home care providers and eight at outpatient departments at a community hospital. More patients treated at the cardiological department (15% of the patients) could have been treated at outpatient departments than at the other departments. However, more patients from pulmonary (26.7%) and orthopaedic (23.3%) departments could have been treated at a community hospital than patients from the cardiological department (2.5%); a statistically significant difference ($p = 0.001$). The nurses (28 patients) and the general practitioners (18 patients) assessed that more patients could have been treated at a community hospital than the specialists (15 patients).

Consensus between the expert panels, within panels and between the professions

The consensus between the panels, and within the panels and between the panellists, was very good when assessing information about the actual medical situation and former medical history (Table 4, Figure 1). We found very good agreement on medication ($\kappa = 1.00$) between the panels and from moderate to very good consensus between the same professions and within the panels. When assessing symptoms, signs, social network and need for home care, there was poor consensus between the panels and from poor (none) to moderate within the panels and within the same professions. Assessing ADL, we found a fair consensus between the panels and from poor

Table 2: Assessments (with 95% Confidence Intervals) of the quality of the discharge letters (N = 100)

	Low	Intermediate	High	Mean score
Actual situation	1 (0-5)	3	96 (90-99)	7.29 (7.10-7.48)
Former medical history	5 (2-11)	3	92 (85-97)	6.84 (6.56-7.12)
Symptoms	28 (24-32)	12	60 (51-69)	5.30 (4.86-5.74)
Signs	31 (22-41)	14	55 (45-65)	5.14 (4.70-5.58)
Medication	12 (7-20)	6	82 (73-89)	6.93 (6.47-7.40)
ADL	16 (9-25)	34	50 (40-60)	5.35 (5.02-5.68)
Social network	80 (71-87)	0	20 (13-29)	1.20 (1.12-1.28)
Need of care	69 (59-78)	0	31 (22-41)	1.87 (1.73-2.00)

Table 3: The assessment (with 95% Confidence Intervals) of health benefits of general hospital care by each profession and by both panels (N = 100)

	Low	Intermediate	High	Mean score
Hospital physicians	8 (4–15)	15	77 (68–85)	6.39 (6.04–6.73)
General Practitioners	15 (9–24)	26	59 (49–69)	5.74 (5.35–6.13)
Public Health Nurses	6 (2–13)	23	71 (61–80)	6.28 (5.97–6.58)
Both panels together	8 (4–15)	22	70 (60–79)	6.27 (5.96–6.58)

(none) to good consensus within the panels and between the same professions.

Also the Bland-Altman diagram showed small variations between the panels (Figure 1). On medication there were no differences between the panels for 21 persons, a difference of one in three cases and two in one case. The largest degree of disagreement between the panels was in relation to the level of benefit gained from general hospital care, with eleven cases with zero and one in difference, and one with two and two with three in difference. The disagreements between the panels occurred mainly when there was a low or medium score on the VAS-scale. Panel (B) had the highest score in nearly all of the 25 cases.

Discussion

In this study from one general hospital we assessed the quality of both referral and discharge letters about older patients to be insufficient in an alarmingly large number of cases. The referral letters were of inappropriate quality in a majority of the cases in all of the assessed fields, except for the actual medical situation, that led to the referral. As less than 20 per cent of the patients were referred from general practitioners' consulting rooms most of the referral letters were written in out of office situations where the patient's medical records were not available to the referring physicians. This explanation was not applicable for the discharge letters. Nonetheless,

many discharge letters were missing vital medical information, did not specify who was responsible for follow-up care and almost none described ADL and the need for home care services. However, the discharge letters were assessed to be of high quality in the majority of cases as far as actual medical situation and former medical history were concerned.

The credibility of a consensus technique depends heavily upon the composition of the panel. Some studies have shown that panels made up with stakeholders with different backgrounds were rating the same statements differently [24,25]. In all likelihood each profession will have difficulty formulating a definition of quality or a gold standard that will be relevant for other professions. Several studies have shown that expert panels composed of appropriate and multidisciplinary experts are able to make valid judgments [24-26]. However, in this study we used two different expert panels and the level of consensus between the panels was presented separately to minimise each stakeholder's effect on the results.

This study focused on the quality of letters between physicians about older patients. Older patients are affected more than younger patients by the consequences of their medical condition as far as their ability to cope in daily activities are concerned. Serious consequences can occur for older patients when letters between primary level and

Table 4: Assessments of consensus between panels A and B on the quality of the referral letters (n = 25)

	Observed agreement	Proportional agreement			κ (95% CI)
		Low	Intermediate	High	
Actual situation	0.84	-	0.00	0.84	0
Former medical history	0.96	1.00	0.50	0.96	0.78 (0.37–1.00)
Symptoms	0.52	0.09	0.00	0.52	0.11 (0.00–0.53)
Signs	0.52	0.09	0.00	0.52	0.10 (0.00–0.47)
Medication	1.00	1.00	1.00	1.00	1.00 (1.00–1.00)
ADL	0.58	0.25	0.18	0.58	0.25 (0.00–0.61)
Social network	0.44	0.67	0.33	0.13	0.14 (0.00–0.44)
Need of care	0.72	0.75	0.15	0.17	0.51 (0.20–0.82)
Benefit of care	0.79	0.00	0.40	0.77	0.35 (0.00–0.86)

secondary level, and vice versa, have incomplete information about ADL, medication and patient's network. This is especially the case if there are uncertainties as to who is responsible for the follow-up care and as to what needs to be followed-up. Older patients, many with reduced mental capacity, are those most dependent on a health care system that is able to communicate appropriately and to transfer information and duties properly.

The general hospital physicians in the panels had a higher confidence in the benefit of general hospital care than the general practitioners did. The nurses, on the other hand, were more confident in community hospital care. Other studies have demonstrated that specialists have a tendency to over-estimate the effect of their own specialty [20,26]. However, several studies in Norway, the Netherlands and UK confirm that appropriate care can be given at an intermediate level [27]; at community hospitals or at general practitioners hospitals [28-30]. We believe that this disagreement between professionals as to the benefit of a general hospital admission may be one of the greater challenges for the understanding of professional collaboration. There has to be a much better dialog between physicians at primary and secondary level to establish a consensus as to the definition of proper care, and what it entails. This may prevent unnecessary referrals to general hospitals and ensure appropriate follow-up care for patients after discharge from general hospitals.

Physicians' letters of poor quality are probably one of several factors contributing to inappropriate care. Without correct information about the patients' ADL and normal medical status, general hospital physicians have to deal with each disease as an isolated medical problem without any possibility of seeing the consequences of the present disease in the patient's daily social context. This in turn may result in discharge letters being written mostly from a general hospital point of view without necessarily addressing the problems that caused the referral in the first place.

This study, along with other similar studies [3-16], demonstrates the importance of establishing better systems for exchanging patient information between primary and secondary level. We also believe that it will be necessary, in the future, for health professionals to reach a consensus as to a definition of what is necessary information and appropriate care at primary and a secondary level. Today there would appear to be uncertainties between the health care levels about duties, responsibilities and possibilities of the care that can be provided by general hospitals or by primary care.

Conclusion

In this study from one general hospital the quality of vital medical information between the health care levels and between physicians in order to provide appropriate care for older patients was insufficient and might represent potential health hazards for older patients. It is necessary to establish a better common consensus between health professionals as to the content and the form of professional communication between the care providers at primary and secondary level.

Competing interests

The author(s) declare that they have no competing interests.

Authors' contributions

HG and RJ developed the idea of, and the design of, the study together. HG was the project coordinator and mediator in the panels, performed the statistical analysis, interpreting the data and drafted the manuscript. RJ helped with the statistical analyses, interpreting the data and the drafting of the manuscript. Both authors have read and approved the final manuscript.

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References

1. Newton J, Eccles M, Hutchinson A: **Communication between general practitioners and consultants; what should their letters contain?** *BMJ* 1992, **304**:821-4.
2. **Norwegian Centre for Informatics in Health and Social Care (KITH)** 2002 [<http://www.kith.no/upload/1085/R32-02EpikriseMedFagligInnhold.pdf>]. Trondheim, Norway: KITH Accessed 4 Aug 2006, [Website in Norwegian].
3. Bolton P, Mira M, Kennedy P, Lahra MM: **The quality of communication between hospitals and general practitioners: an assessment.** *J Qual Pract* 1998, **18**:241-7.
4. Rognstad S, Strand J: **Do general practitioners know what medication community nurse give their shared patients?** [In Norwegian]. *Tidsskr Nor Laegeforen* 2004, **124**:810-12.
5. Tuomisto LE, Marina E, Minna K, Brander PE, Ritva K, Hannu P, Pertti K: **The Finnish asthma programme; communication in asthma care-quality assessments of asthma referral letters.** *J Eval Clin Pract* 2007, **13**:50-4.
6. Jensen SA, Øien T, Jacobsen T, Johnsen R: **Erroneous drug charts – a health hazard?** [In Norwegian]. *Tidsskr Nor Laegeforen* 2003, **123**:3598-9.
7. Glinthorg B, Andersen SE, Dalhoff K: **Insufficient communication about medication use at the interface between hospital and primary care.** *Qual Saf Health Care* 2007, **16**:34-9.
8. Kasje WN, Denig P, De Graeff PA, Haaijer-Ruskamp FM: **Physicians' views on joint treatment guidelines for primary and secondary care.** *Int J Qual Health Care* 2004, **16**:229-36.
9. Kværner KJ, Tjerbo T, Botten G, Aasland OG: **Hospital discharge information as a communication tool.** [In Norwegian]. *Tidsskr Nor Laegeforen* 2005, **125**:2815-7.
10. Solet DJ, Norvell JM, Rutan GH, Frankel RM: **Lost in translation: challenges and opportunities in physician-to-physician communication during patient handoffs.** *Acad Med* 2005, **80**:1094-9.

11. Arora V, Johnson J, Lovinger D, Humphrey HJ, Meltzer DO: **Communication failures in patient sign-out and suggestions for improvement: a critical incident analysis.** *Qual Saf Health Care* 2005, **14**:401-407.
12. Roth-Isigkeit A, Harder S: **Reporting the discharge medication letter. An exploratory survey of family doctors. [In German].** *Med Klin* 2005, **100**:87-93.
13. Rubak SL, Mainz J: **Communication between general practitioners and hospitals. [In Danish].** *Ugeskr Laeger* 2000, **162**:648-653.
14. Bourke JL, Bjeldbak-Olesen I, Nielsen PM, Munck LK: **Joint charts in drug handling. Toward increased drug safety. [In Danish].** *Ugeskr Laeger* 2001, **163**:5356-60.
15. Jiwa M, Skinner P, Coker AO, Shaw L, Campbell MJ, Thompson J: **Implementing referral guidelines: lessons from negative outcome cluster randomised factorial trial in general practice.** *BMC Family Practice* 2006, **7**:65.
16. Harris MF, Giles A, O'Toole BI: **Communication across the divide. A trial of structured communication between general practice and emergency departments.** *Aust Fam Physician* 2002, **31**:197-200.
17. Ebbesen J, Buajordet I, Eriksen J, Brors O, Hilberg T, Svaar H, Sandvik L: **Drug-related deaths in a department of internal medicine.** *Archives of Internal Medicine* 2001, **161**:2317-23.
18. Buajordet I, Ebbesen J, Eriksen J, Brors O, Hilberg T: **Frequency, reporting and classification of drug-related deaths. [In Norwegian].** *Tidsskr Nor Laegeforen* 1995, **115**:2373-5.
19. Hall C, Bjørner T, Martinsen H, Stavem K, Weberg R: **The good discharge summary – criteria and evaluation.** *Tidsskr Nor Laegeforen* 2007, **127**:1049-52.
20. Jones J, Hunter D: **Consensus methods for medical and health services research.** *BMJ* 1995, **311**:376-80.
21. Fleis JL: **The Measurement of Interrater Agreement In Statistical Methods for Rates and Proportions.** New York: John Wiley; 1981:213-236.
22. Altman DG: **Practical Statistics for Medical Research.** 5th edition. London: Chapman & Hall; 1991:403-409.
23. Krummenauer F: **Difference plots or scattergram – when to use which? [Article in German].** *Klin Monatsbl Augenheilkd* 2002, **219**:682-5.
24. Coulter I, Adams A, Shekelle P: **Impact of varying panel membership on ratings of appropriateness in consensus panels: a composition of multi and single disciplinary panel.** *Health Serv Res* 1995, **30**:577-91.
25. Campbell SM, Hann M, Roland MO, Quayle JA, Shekelle PG: **The effect of panel membership and feedback on ratings in a two-round Delphi survey.** *Med Care* 1999, **37**:964-8.
26. Ayanian JZ, Landrum MB, Normand SL, Guadagnoli E, McNeil BJ: **Rating the appropriateness of coronary angiography – do practicing physicians agree with an expert panel and with each other?** *N Engl Med* 1998, **338**:1896-1904.
27. **British Geriatrics Society. Intermediate Care. Guidance for Commissioners and Providers of Health and Social Care (revised 2004). BGS Compendium Document 4.2.** London 2004 [http://www.bgs.org.uk/Publications/Compendium/compend_4_2.htm]. Accessed 4 Aug 2006
28. Aaraas I, Førde OH, Kristiansen IS, Melbye H: **Do general practitioner hospitals reduce the utilisation of general hospital beds? Evidence from Finnmark County in North Norway.** *J Epidemiol Community Health* 1998, **52**:243-46.
29. Hakkaart-van Roijen L, Charante EP, Bindels PJE, Yzermans CJ, Rutten FFH: **A cost study of a general practitioners hospital in the Netherlands.** *Eur J Gen Pract* 2004, **10**:45-9.
30. Hensher M, Fulop N, Coast J, Jefferys E: **Better out than in? Alternatives to acute hospital care?** *BMJ* 1999, **319**:1127-1130.

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Paper II

Research article

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Intermediate care at a community hospital as an alternative to prolonged general hospital care for elderly patients: a randomised controlled trial

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Abstract

Background: Demographic changes together with an increasing demand among older people for hospital beds and other health services make allocation of resources to the most efficient care level a vital issue. The aim of this trial was to study the efficacy of intermediate care at a community hospital compared to standard prolonged care at a general hospital.

Methods: In a randomised controlled trial 142 patients aged 60 or more admitted to a general hospital due to acute illness or exacerbation of a chronic disease 72 (intervention group) were randomised to intermediate care at a community hospital and 70 (general hospital group) to further general hospital care.

Results: In the intervention group 14 patients (19.4%) were readmitted for the same disease compared to 25 patients (35.7%) in the general hospital group ($p = 0.03$). After 26 weeks 18 (25.0%) patients in the intervention group were independent of community care compared to seven (10.0%) in the general hospital group ($p = 0.02$). There were an insignificant reduction in the number of deaths and an insignificant increase in the number of days with inward care in the intervention group. The number of patients admitted to long-term nursing homes from the intervention group was insignificantly higher than from the general hospital group.

Conclusion: Intermediate care at a community hospital significantly decreased the number of readmissions for the same disease to general hospital, and a significantly higher number of patients were independent of community care after 26 weeks of follow-up, without any increase in mortality and number of days in institutions.

Background

An increasing demand among elderly for hospital beds and other health services make allocation of resources to the most efficient care level a vital issue [1]. In 1995 there were 42.8 admissions to general and university hospitals

per 100 persons above 80 years in Norway. This increased by more than 40% to 60.8 in 2005 [2].

Both in UK and Norway there is a particular challenge of Payment by Results where tariffs in general and university hospitals are set on a diagnosis and procedure-based sys-

tem, which does not account for increased lengths of stay for patients with physical disability [3,4]. In the UK the number of persons with physical disability and a high level of need of care are estimated to increase by 54% by 2025, most of these will be older persons [5]. In addition to the loss of health and function for the patients and the social and economic burden for their families, this increased need of care is considered to be a major economic challenge for societies worldwide [1].

Moreover, fragile elderly patients often have to stay at general hospitals after the treatment of the acute illness is completed due to lack of a stable social network, lack of familial or municipal capacity to deliver proper care in their own homes or shortage of suitable nursing home beds [6].

The health care provision in Norway is based on a decentralised model [7]. The municipalities (primary health care) are responsible for home care services, nursing homes, community hospitals, family physicians, health services for mothers, children and youth, midwives, physiotherapists, occupational therapists and emergency services. The government (secondary health care) owns and runs district general hospitals, university hospitals and ambulance services through regional health authorities (five regions).

In 2001 an intermediate care department was established at a teaching nursing home (community hospital) [8] located in the city of Trondheim, Norway to perform intermediate care [9] for older patients initially admitted at the city general hospital, but without any need for further advanced hospital care. The goal was to create a department functioning as a new link between advanced care at a general hospital and community home care to optimise recovery before returning home after general hospital care [7]. There is little published knowledge about patient outcome and cost effectiveness when intermediate care [9] is provided at a community hospital instead of standard care at a general hospital [10-14].

Aims

The aim was to test the hypothesis that intermediate care at a community hospital compared to traditional prolonged care at a general hospital would reduce morbidity assessed as number of readmissions for the same disease to the general hospital, need of home care services and long-term nursing homes without increasing mortality and the number of days in institutions.

Methods

Setting

Twenty beds at Søbstad Nursing Home were re-assigned in late 2002 to be a community hospital performing inter-

mediate care, which included increased numbers of trained nurses from 12.5 to 16.7 man-labours per week and doctors' hours, performed by three general practitioners, from 7 hours to 37.5 hours per week. All employees underwent a training programme provided by the general hospital. The department was also upgraded with laboratory facilities including intravenous pumps, equipment for continuously monitoring of oxygen-saturation in blood, laboratory equipment to measure infectious variables, hemoglobin and glucose in blood. Other blood tests could be delivered each day to the main laboratory at the general hospital with answers provided within the same working day.

The city general hospital in Trondheim, St. Olavs University Hospital, is both a general hospital for the municipality of Trondheim and a university hospital for the three counties in Mid-Norway. In this trial the function as a general hospital was included.

Intermediate care intervention

The experimental intervention was based on individualised intermediate care including evaluation and treatment ("care" and "cure") of each patient's diseases [13]. However, the main focus was to improve the patients' ability to manage daily activities when returning home.

On admission to the community hospital the physicians performed a medical examination of the patients and a careful evaluation of available earlier health records from the admitting general practitioner, the general hospital physicians and the community home care services. The communication with each patient and his family focusing on physical and mental challenges was also essential to understand the needs and level of care.

The care at the different departments at the general hospital and the communication with primary health care followed the standard routines through the formal organisation.

Trial design

Intermediate care at the community hospital was compared to conventional care in general hospital beds at medical, surgical and orthopedic departments.

Before the trial started participating physicians and nurses at the general hospital together with general practitioners and community nurses developed inclusion criteria through a Delphi technique [15]. One of the authors (HG) facilitated requests for proposals and organised the proposals received, and was responsible for communication between the participants. Eventually, there were four inclusion criteria as eligible participants should be; 1) patients aged 60 years or more admitted the general hos-

pital due to an acute illness or an acute exacerbation of a known chronic disease, 2) probably be in need of inward care for more than three to four days, 3) admitted from their own homes and 4) expected to return home when inward care was finished. Exclusion criteria were severe dementia or a psychiatric disorders needing specialised care 24 hours a day.

When an eligible patient was identified and accepted for inclusion, a blinded randomisation was performed by the Clinical Research Department at the Faculty of Medicine using random number tables in blocks to ensure balanced groups.

The number of deaths was monitored continuously during the whole trial as it was decided prior to the study that an increase in number of deaths at the community hospital should terminate the study.

Outcome variables were number of readmissions for the same disease, need of community home care and need of long-term nursing home. Readmissions for the same disease, according to the national definition, are defined as acute, non-planned admissions within 60 days for the same disease. Number of days in institutions after randomisation, number of deceased patients and days before death were assessed as well. All data were collected by one of the authors, (HG), according to prepared schemes from patients' medical records at the hospitals and at primary health services. The assessments of days in institution, readmissions and cause-specific deaths were monitored through the patient administrative systems, independent of treatment groups.

Two specially trained nurses monitored physical functioning (ADL) on 72 items with scores from one to four in each item, both at the intermediate department and at the general hospital, by a national system, Gerix [16]. With an average ADL of one the patient is functioning perfectly in all areas, whereas an average score of four indicates a need of excessive help and care in all aspects of daily living. ADL was assessed for all patients prior to the inclusion to the trial, and the ADL was used as covariate or confounder in the multivariate analysis. General hospital doctors set the diagnosis at all patients prior to randomisation.

Approval

The Regional Committee for Medical Research Ethics for Central Norway approved the study, the patient information and the consent schemes. The study was granted license by the Norwegian Data Inspectorate to process personal health data. Each participating patient signed a written informed consent formula at the general hospital prior to the inclusion to the study.

Statistical analysis

The sample size was estimated to detect a difference of 25 per cent in the number of readmissions for the same disease, as an assessment of morbidity, between the groups with alpha 0.05 and power of 0.80. To achieve this we needed 65 patients in each group, altogether 130 patients.

All data are presented and analysed according to the CONSORT checklist (see Additional file 1). The comparisons between the intervention and control group were analysed as intention-to-treat analyses according to the CONSORT instructions. Some results from treatment analyses, dependent on where the patient received his treatment, are also presented.

We undertook all analyses using SPSS version 14.0. for Windows. Survival curves were estimated by Kaplan-Meier. The distribution of continuous variables was tested by comparing means and medians and by normality plots. Differences in number of patients with readmissions for the same disease and need of home care services or nursing homes between groups were tested by chi square tests, and differences in mean number of days in institution were tested both by paired t-test and by Wilcoxon signed rank test. Differences in readmissions and need of home care or nursing home were also analysed in logistic models adjusted for gender, age, ADL score and diagnosis. Hosmer and Lemeshow's goodness of fit test tested the fit of the logistic models. The number of days in institution was compared between groups using covariance analyses with age, gender, ADL scores and diagnoses as covariates. The level of significance was set to $p = 0.05$.

Results

From August 2003 until the end of May 2004 142 patients were eligible for inclusion and 70 were randomised to continued care at the general hospital (general hospital group) and 72 to the community hospital (intervention group) (Figure 1). All patients randomised for care at the community hospital were transferred from the general hospital within 24 hours after the time of inclusion to the study and immediately after the time of randomisation. Sixty-four patients were transferred from the general hospital to intermediate care (intermediate care group), as eight of the patients randomised for intervention were never transferred due to an acute and severe deterioration of their medical conditions after inclusion. In the intention-to-treat analyses they were included in the intervention group, otherwise, in the treatment-analyses they were dealt with as a separate group. There were no dropouts, except for deaths, during the trial and for all patients all data were collected from the first day at the general hospital and until the end of the trial or at the time of death.

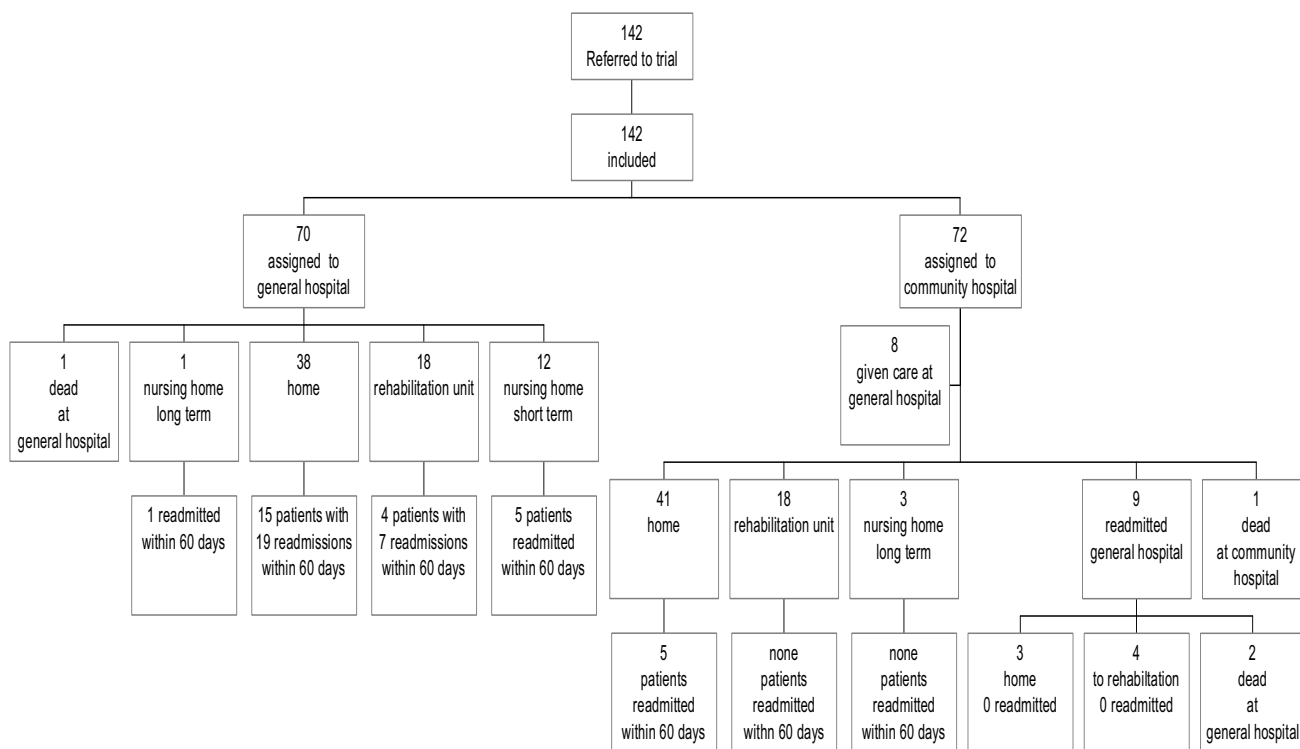


Figure 1
Trial profile and flow chart the first 60 days.

Patient characteristics

At randomisation (index day), the patients randomised to intermediate care or to general hospital care were comparable with respect to number of days of care before randomisation, mean and median age, diagnosis, gender, ADL and matrimonial status (Table 1).

The general hospital group had the best mean ADL, 2.05, and the intervention group somewhat worse with a mean score at 2.24, a non-significant difference ($p = 0.27$). The eight patients not transferred to intermediate care, due to their medical condition, had a more severe loss in ADL, mean score 2.60.

Readmissions for the same disease

Fourteen patients (19.4%) in the intervention group were readmitted for the same disease. Nine (64.3%) of these readmissions took place while the patients were at the department and five (35.7%) after discharge to their homes. Of the patients in the general hospital group 25 patients (35.7%) were readmitted, comprising 32 readmissions. Nineteen (76.0%) of these patients were readmitted after discharge to their homes and six (24.0%) during care at rehabilitation departments. OR for readmissions for the same disease in the intervention group versus the general hospital group was 2.77 (95% CI

1.18–6.49) (Table 3). There was statistically a significant difference between the two groups ($p = 0.03$). In a multivariate analysis, adjusted for gender, age, diagnosis and ADL score, there was also a significant difference ($p = 0.02$). In a treatment-analysis there was still a significant difference ($p = 0.02$).

Need of nursing homes and home care after six months

Six months after discharge from intermediate care or from care at the general hospital 38 patients (52.8%) in the intervention group and 44 patients (62.9%) in the general hospital group needed home care, a non-significant difference. The OR for the need of home care was 1.21 (95% CI 0.59–2.52) in the intervention group versus the general hospital group (Table 3).

Eighteen (25.0%) patients in the intervention group were independent of home care compared to seven (10.0%) in the general hospital group ($p = 0.02$) (Table 2). The OR was 0.31 (95% CI 0.11–0.88) in favour of the intervention group. In the treatment-analysis the differences was still statistically significant ($p = 0.02$).

Twelve patients, seven (9.7%) from the intervention and five (7.1%) from the general hospital group, were living at long-term nursing homes, a non-significant difference,

Table 1: Baseline characteristics. Trondheim 2003–4.

	Assigned community hospital		Assigned general hospital
	Intermediate care group (n = 64)	Intervention group (n = 72)	General hospital group (n = 70)
Demography			
Gender			
Males	14 (21.9%)	20 (27.8%)	27 (38.6%)
Females	50 (78.1%)	52 (72.2%)	43 (61.4%)
Age males			
Mean (SD)	79.5 (1.5)	80.6 (1.1)	78.4 (1.2)
Median	79.0	80.0	79.0
Age females			
Mean (SD)	81.4 (1.1)	80.6 (1.1)	83.1 (1.0)
Median	82.5	82.0	83.0
Age both genders			
Mean (SD)	80.9 (0.9)	80.6 (0.8)	81.3 (0.8)
Median	81.5	81.5	81.0
Living with spouse			
Males	7	10	9
Females	6	6	6
ADL-scores			
Both genders			
Mean (SD)	2.19 (0.1)	2.24 (0.9)	2.05 (0.7)
Median	2.13	2.29	2.02
Males			
Mean (SD)	2.30 (0.2)	2.42 (0.9)	2.08 (0.1)
Median	2.37	2.37	2.00
Females			
Mean (SD)	2.17 (0.1)	2.24 (0.8)	2.05 (0.1)
Median	2.10	2.18	2.03
Primary diagnoses			
Cardiological diseases	21 (32.8%)	22 (30.6%)	20 (28.6%)
Infections	7 (10.9%)	13 (18.1%)	16 (22.9%)
Fractures/contusions	13 (20.3%)	14 (19.4%)	12 (17.1%)
Pulmonary diseases	5 (7.8%)	5 (6.9%)	6 (8.6%)
Neurological diseases	5 (7.8%)	5 (6.9%)	4 (5.7%)
Cancers	2 (3.1%)	2 (2.8%)	4 (5.7%)
Psychiatric diseases	1 (1.6%)	1 (1.4%)	0 (0%)
Other diseases	10 (15.6%)	10 (13.9%)	8 (11.4%)

and the OR between the intervention and hospital groups were 2.19 (95% CI 0.51–9.40).

Number of days of care after randomisation

Patients in the intervention group stayed on average 17.5 days (95% CI 14.6–20.4) for initial intermediate care, 10.4 days (95% CI 5.6–15.2) at rehabilitation departments and 3.1 days (95% CI 1.2–5.0) at the general hospital due to readmissions for the same disease, giving a total average of number of days with inward care after the index day of 31.0 days (95% CI 26.1–34.7) (Table 4). Patients in the general hospital group stayed 9.1 days (95% CI 6.9–11.2) at the general hospital for initial care, 13.1 days (95% CI 8.2–18.1) at various rehabilitation departments and were readmitted 7.6 days (95% CI 3.6–

11.6) at the general hospital, giving a total of the number of 29.8 days (95% CI 23.2–36.4) with inward care after the index day.

There was a non-significant difference in the total number of days with inward care between the patients' groups ($p = 0.79$), (paired t-test, using Wilcoxon signed rank test did not change the level of significance). Adjusting number of days of care for gender, age, ADL and diagnosis, there was still an insignificant difference in number of days at the institutions between the groups ($p = 0.80$). However, there was a significant difference in number of days of initial care in favour of the general hospital group ($p = 0.00$), and in number of readmission days in favour of the intervention group ($p = 0.04$) (Table 4).

Table 2: Numbers of readmissions for the same disease, deaths, need of nursing homes and home care. P-values based on comparisons between intervention and general hospital groups according to intention-to-treat analyses. Trondheim 2003–4.

	Assigned community hospital		Assigned general hospital	p-values	adjusted p ¹
	Intermediate care group (n = 64)	Intervention group (n = 72)	General hospital group (n = 70)		
Readmissions ²	13 (20.3%)	14 (19.4%)	25 (35.7%)	0.03	0.02
Deaths	8 (12.5%)	9 (12.5%)	14 (20%)	0.23	0.15
Nursing homes ³	7 (10.9%)	7 (9.7%)	5 (7.1%)	0.45	0.76
Home care	32 (50.0%)	38 (52.8%)	44 (62.9%)	0.22	0.37
No care	17 (26.6%)	18 (25.0%)	7 (10.0%)	0.02	0.01

¹ Adjusted for age, gender, ADL, diagnosis

² Readmissions for the same disease

³ Long-term nursing homes

Mortality within six months

Twenty-three patients, nine (12.5%) in the intervention group and 14 (20%) in the general hospital group, died within six months (Table 2, Figure 2), a non-significant difference (p = 0.23). There were no differences between males (17.0% deceased) and females (16.1% deceased). In a treatment-analysis the difference in number of deaths was still statistically insignificant.

Discussion

This trial demonstrated that elderly patients with acute diseases or deterioration of a chronic disease initially handled at a general hospital and subsequently offered intermediate care, had lower readmission rates (p = 0.03), and had a higher number of patients independent of community care (p = 0.02) than patients given traditional prolonged care at a general hospital. The differences in total number of days with inward care were minor. The differences in number of deaths and need of home care were in favour of the intervention group, however, statistically insignificant.

All patients were transferred immediately after randomisation to the community hospital except the eight patients with a severe and acute deterioration of their disease. These patients could have been treated as readmissions for the same diseases in the intention-to-treat analyses. However, the decisions not to transfer these patients were

undertaken by the physicians at the general hospital and not by the physicians at the community hospital. Treated as readmissions in the statistical analyses resulted in an insignificant reduction of the number of readmissions (p = 0.14, adjusted p = 0.11) and an insignificant difference in number of days readmitted in favour of the intervention group; 4.4 (95% CI 2.6–6.9) days versus 7.6 (95% CI 3.6–11.6) days.

The present study appears to be the first randomised controlled trial where included patients have been an unselected general hospital population above 60 years of age. Another strength of this trial was that all patients received the same optimal care in the initial stage of their illness before randomisation.

As one of the authors, blinded for which group the patients belonged to, collected all information from medical records and from the patient administrative systems, information bias by collection was possible. As all data was objective measures as readmissions for the same disease, use of home care and number of deaths, the registration was considered to be accurate.

Several efforts have been developed to reduce number of days of inward care and to facilitate discharge from general hospitals including discharge planning, nurse led inpatient care, hospital at home regimes, general practi-

Table 3: The risks of readmissions for the same disease, deaths, need of nursing home, and the use of home care assessed as OR between intervention (0) and general hospital group (1) according to intention-to-treat analyses with 95% Confidence Intervals. Trondheim 2003–4.

	OR	95% CI
Readmissions for the same disease	2.77	1.18–6.49
Deaths	1.91	0.72–5.01
Long-term nursing homes	2.19	0.51–9.40
Home care	1.21	0.59–2.52
No public care	0.31	0.11–0.88

Table 4: Number of days (with 95% Confidence Intervals) in institution after randomisation. Trondheim 2003–4.

	Assigned community hospital		Assigned general hospital		p-values	adjusted p ¹
	Intermediate care group (n = 64)	Intervention group (n = 72)	General hospital group (n = 70)			
Number of days before randomisation ²	10.6 (9.0–12.1)	10.7 (9.2–12.1)	10.0 (8.2–11.8)		0.6	0.8
Number of days initial care	17.9 (14.7–21.1)	17.5 (14.6–20.4)	9.1 (6.9–11.2)		0.00	0.00
Days at rehabilitation units	9.6 (4.9–14.2)	10.4 (5.6–15.2)	13.1 (8.2–18.1)		0.43	0.22
Number of readmission days ²	3.3 (1.2–5.4)	3.1 (1.2–5.0)	7.6 (3.6–11.6)		0.04	0.02
Total number of days of inward care	30.8 (25.2–36.3)	31.0 (26.1–34.7)	29.8 (23.2–36.4)		0.79	0.80

¹Adjusted for age, gender, ADL score and diagnosis

²Readmissions at general hospital for the same disease

tioners hospitals, community hospitals and patients hotels [10]. Some studies have found a better functional outcome and reduced mortality when older patients were treated at specialised geriatric wards [17-19], whilst the benefit of early supported discharge of stroke patients was ascribed a structured collaboration between primary and secondary health care [20,21].

Several community hospitals in Norway are comparable with community hospitals in England [7,8] and general practitioners hospitals in Holland [23] where some stud-

ies have explored their appropriateness [11,12,22-25]. In Norway the use of nursing homes and community hospitals may have been overlooked as appropriate alternatives, and research on such models has been sparse both nationally and internationally [7,22].

A limitation of performing intermediate care is the lack of possibility to identify which of the components that are working so well. However, some of the main components in the intervention were assessments of ADL and a consecutive and closely communicating and cooperating with each patient and his social and professional networks to identify the best supportive solutions. This communication, including the continuous dialogue with the rest of the primary health care in the municipality, was probably the central element of the care that seems to be efficient in reducing the number of readmissions for the same disease, the need of community care and allowing the professional teams to optimise the follow-up after discharge.

The communication process is always complex. Older people are a more heterogeneous group than younger people, and maybe they have experienced several more or less successful diagnosing and treatment procedures. Health personal and older people can have different perception of what are illness and the consequences of illness. As a consequence, unclear communication can cause the whole medical encounter to fall apart.

Intermediate care at a community hospital seems to be highly effective.

In a modern health care system care is more and more specialised, fragmented and organ-focused. In addition to the expansion of further sub-specialising in modern medicine, the results from this study underscore the additional need of better step-down care systems at an intermediate level. It is indeed relevant to question the appropriateness of prolonged traditional general hospital care for this rapidly increasing group of patients.

There are little existing scientific evidence of the benefits of intermediate care [26] and more randomised control-

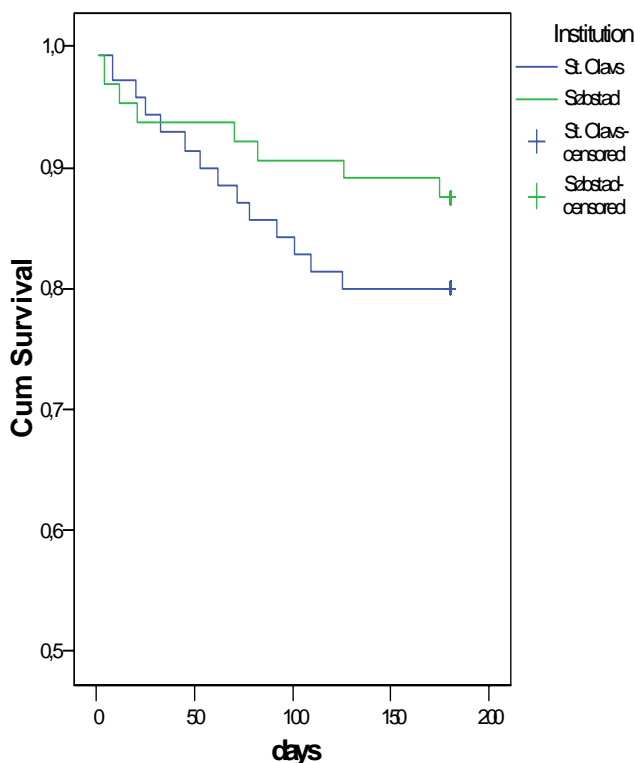


Figure 2
Accumulated survival rates. Survival time after intermediate care (Søbstad): 165 days (95% CI 154–176) Survival time after general hospital care (St. Olavs): 156 days (95% CI 144–165)

led trials are necessary to test different models for intermediate care at community hospitals as alternatives to general hospital admissions and as alternatives to prolonged general hospital care to confirm any benefits of intermediate care. Additionally, the economic consequences have to be explored.

Conclusion

Intermediate care at a community hospital compared to ordinary prolonged care at a general hospital, reduced significantly the number of readmissions for the same disease to the general hospital and increased significantly the number of patients being independent of community care after 26 weeks of follow-up, with an insignificant increase in the number of days in institutions and without any increase in mortality. Regarding morbidity and mortality after 26 weeks of follow-up, the results favors alternative intermediate care at primary level.

Competing interests

The author(s) declare that they have no competing interests.

Authors' contributions

HG and RJ developed the idea of and the design of the study together. HG was the project coordinator and mediator in the panels, performed the statistical analyses, interpreting the data and drafted the manuscript. RJ helped with the statistical analyses, interpreting the data and drafting of the manuscript. RW developed the procedures and helped with the interpreting the data and drafting of the manuscript.

Additional material

Additional file 1

The CONSORT Checklist presenting all items to be included when reporting the present randomised trial.

Click here for file

[<http://www.biomedcentral.com/content/supplementary/1471-2458-7-68-S1.doc>]

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References

- Dang T, Antolin P, Oxley H: **Fiscal Implications of Ageing: Projections of age-related spending.** In *Economics departments working papers no 305, ECO/WKP(2001)31* Paris: Organisation for Economic Co-operation and Development (OECD).

- Statistics of Norway: **24 hour hospitalisations in Norway 80 years and older. 1995–2005.** Oslo. 2006 [http://www.shdir.no/norsk_pasientregister/somatikk/statistikk_og_rapporter/]. (Accessed 10 Dec 2006)
- Carpenter GI: **Accuracy, validity and reliability in assessment and evaluation of services for older people: the role of the interRAI MDS assessment system.** *Age and Aging* 2006, **35**:327-329.
- SINTEF Health Research: **Activity Based Financing in Norway. Trondheim, Norway.** 2006 [http://www.shdir.no/kodeverk_og_pasientklassifiseri/drg/]. (Accessed 26 July 2006)
- Jagger C, Matthews R, Spiers N, Brayne C, Comas-Herrera A, Robinson T, Lindesay J, Croft P: **Compression Or Expansion Of Disability? Forecasting Future Disability Levels Under Changing Patterns of Diseases. Final report.** University of Leicester; 2006. KF 117 02/06
- de Bey JS, Huijsman R, van der Cammen TJ: **Delayed discharge of older patients from the Department of Geriatric Medicine of the Erasmus Medical Centre and factors affecting the length of stay; July 2001–June 2002.** [In Dutch]. *Abstract. Ned Tijdschr Geneesk* 2004, **148**:2438-42.
- Garåsen H, Kaasa S, Rosstad T, Broen P: **Specialised short-term wards in nursing homes: a professionally and financially sound solution.** [In Norwegian]. *Tidsskr Nor Laegeforen* 2005, **125**:1503-5.
- Donald IP, Jay T, Lidsell J, Foy C: **Defining the appropriate use of community hospital beds.** *British Journal of General Practice* 2001, **51**:95-100.
- British Geriatrics Society: **Intermediate Care. Guidance for Commissioners and Providers of Health and social Care (revised 2004).** 2004 [http://www.bgs.org.uk/Publications/Compendium/compend_4-2.htm]. BGS Compendium Document 4.2. London (Accessed 29 Jul 2006)
- Hensher M, Fulop N, Coast J, Jefferys E: **Better out than in? Alternatives to acute hospital care.** *BMJ* 1999, **319**:1127-1130.
- Greene J, Young J, Forster A, Mallinder K, Bogle S, Lawson K, Small N: **Effects of locality based community hospital care on independence in older people needing rehabilitation: randomised controlled trial.** *BMJ* 2005, **331**:317-322.
- Round A, Crabb T, Buckingham K, Mejnzer R, Pearce V, Ayres R, Weeks C, Hamilton W: **Six months outcomes after emergency admission of elderly patients to a community or a district general hospital.** *Family Practice* 2004, **21**:173-179.
- Rubin FH, Williams JT, Lescisin DA, Mook WJ, Hassan S, Inouye SK: **Replicating the Hospital Elder Program in a community hospital and demonstrating effectiveness using quality improvement methodology.** *J Am Geriatr Soc* 2006, **54**:969-74.
- Walsh B, Steiner A, Pickering RM, Ward-Basu J: **Economic evaluation of a nurse led intermediate care versus standard care for post-acute medical patients: cost minimisation analysis of data from a randomised controlled trial.** *BMJ* 2005, **330**:699.
- Jones J, Hunter D: **Consensus methods for medical and health services research.** *BMJ* 1995, **311**:376-80.
- Holmøy J: **Gerix 1995–1999. Dokumentasjon, system, data, program.** 2002 [http://www.ssb.no/emner/03/90/notat_200210/notat_200210.pdf]. Oslo; SSB [In Norwegian] (Accessed 23.08.06)
- Saltvedt I, Mo ES, Fayes P, Kaasa S, Sletvold O: **Reduced mortality in treating acutely sick, frail older patients in a geriatric evaluation and management unit. A prospective randomized trial.** *J Am Geriatr Soc* 2002, **50**:792-8.
- Asplund K, Gustafson Y, Jacobsson C, Bucht G, Wahlin A, Peterson J, Blom JO, Angquist KA: **Geriatric-based versus general wards for older acute medical patients: A randomized comparison of outcomes and use of resources.** *J A Geriatric So* 2000, **11**:1381-8.
- Slaets JP, Kaufmann RH, Duivenvoorden HJ, Pelemans W, Schudel WJ: **A randomized trail of geriatric liaison intervention in elderly medical inpatients.** *Psychosom Med* 1997, **59**:585-91.
- Fjaertoft H, Indredavik B, Magnussen J, Johnsen R: **Early Supported Discharge for Stroke Patients Improves Clinical Outcome. Does It Also Reduce Use of Health Services and Costs?** *Cerebrovasc Dis* 2005, **19**:376-383.

21. Indredavik B, Fjaertoft H, Ekeberg G, Loge AD, Mørch B: **Benefit of an extended stroke unit service with early supported discharge: A randomized trial.** *Stroke* 2000, **31**:2989-94.
22. Aaraas I, Forde OH, Kristiansen IS, Melbue H: **Do general practitioners hospitals reduce the utilisation of general hospital beds? Evidence from Finnmark County in north-Norway.** *J Epidemiol Community Health* 1998, **52**:243-6.
23. Hakkaart-vanRoijen L, Moll van Charante EP, Bindels P, Yzermans CJ, Rutten FFH: **A cost study of a general practitioner hospital in the Netherlands.** *European Journal of General Practice* 2004, **10**:45-49.
24. Applegate WB, Millner ST, Graney MJ, Burns R, Akins DE: **A randomized, controlled trial of a geriatric assessment unit in a community rehabilitation hospital.** *N Engl J Med* 1990, **332**:1572-8.
25. Counsell SR, Holder CM, Liebenauer LL, Palmer RM, Fortinsky RH, Kresevic DM, Quinn LM, Allen KR, Covinsky KE, Landefeld CS: **Effects of a multicomponent intervention on functional outcomes and process of care in hospitalized patients: A randomized controlled trial of Acute Care for the Elderly (ACE) in a community hospital.** *J Am Geriatric Soc* 2000, **48**:1572-81.
26. Melis RJF, Rikkert MGMO, Parker SG, van Eijken MIJ: **What is intermediate care?** *BMJ* 2004, **329**:360-361. (Downloaded from BMJ.com on 04. March 2007)

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Paper III

Eldre pasienter i sykehus eller i intermedieær-avdeling i sykehjem – en kostnadsanalyse

Sammendrag

Bakgrunn. I en randomisert, kontrollert studie ble det vist at behandling av eldre pasienter i intermedieæravdelingen i sykehjem gir færre reinnleggelser og lavere dødelighet enn tradisjonell behandling i sykehus. I denne artikkelen sammenlikner vi kostnadene ved de to behandlingalternativene.

Materiale og metode. 142 pasienter over 60 år innlagt ved St. Olavs Hospital for akutt sykdom eller forverring av kronisk sykdom ble enten slutt- og etterbehandlet i en intermedieæravdeling i et sykehjem eller i sykehuset. Pasientene ble fulgt i ett år eller til død, og kostnadene til sykehusbehandling og kommunale omsorgstjenester ble kartlagt.

Resultater. Behandlingskostnadene for aktuell sykdom var i gjennomsnitt kr 39 650 (95 % KI kr 30 996–48 304) i sykehjemgruppen sammenliknet med kr 73 417 (95 % KI kr 52 992–93 843) i sykehusgruppen ($p = 0,002$). Det var ikke signifikante forskjeller i kostnader for omsorgs- eller sykehustjenester, unntatt for reinnleggelser, i oppfølgingsåret. Gjennomsnittlige behandlings- og omsorgskostnader per pasient og dag for hele observasjonsperioden var kr 606 (95 % KI kr 450–761) i sykehjemgruppen sammenliknet med kr 802 (95 % KI kr 641–962) i sykehusgruppen ($p = 0,026$).

Fortolkning. Etter- og sluttbehandling ved intermedieærheten i sykehjem innebærer lavere kostnader enn tradisjonell behandling i sykehus. Forskjellene i kostnader skyldes hovedsakelig lavere sykehuskostnader for sykehjemgruppen på grunn av færre reinnleggelser.

Registrering av studien: ClinicalTrials.gov
NCT00235404

Oppgitte interessekonflikter: Ingen

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Det har skjedd en betydelig vekst i utgiftene til både sykehusbehandling og kommunale omsorgstjenester de siste ti årene (1). Kostnadene til kommunale hjemmetjenester og sykehjem økte med 131 % i løpende priser og var i 2006 på 45,3 milliarder kroner, mens kostnadene til sykehusbehandling i samme periode økte med 84 %, til 50,6 milliarder. De eldre pasientene legger samtidig beslag på en stadig økende andel av sykehussengene (2). Ifølge nasjonale og internasjonale utredninger vil antall personer med kronisk sykdom og nedsatt funksjonsnivå, spesielt blant de eldre, øke betydelig de neste 20 år (3, 4). Det er indikasjoner på at det er den siste tiden før døden, uavhengig av pasientens alder, som er mest ressurskrevende (5–7).

Det har i flere nordeuropeiske land vært reist spørsmål ved om det kan være alternativer til kostbar sykehusbehandling (8–11). I England har det vært gjennomført utredninger over hva som skal ligge i begrepet intermedieærbehandling (12), og hva som anses som riktig behandling i såkalte «community hospitals» (13). «Community hospitals» i England er enheter med lavere bemanning og mindre medisinske teknologisk utstyr enn ordinære akutt sykehus og kan på en del områder sammenliknes med sykestuer, intermedieæravdelinger og såkalte halvannenlinjetjenester i Norge (14–17).

Noen studier i England har vist at behandling i «community hospitals» kan gi bedre funksjonsnivå for enkelte pasientgrupper enn behandling i tradisjonelle sykehus (18, 19), mens de økonomiske resultatene ikke er entydige. Spesielt har sykepleier-

drevne intermedieær enheter vist seg å være kostnadskrevende, grunnet økte liggetider (20, 21).

På grunn av et betydelig antall korridor-pasienter og utskrivningsklare pasienter ved St. Olavs Hospital ble intermedieæravdelingen ved Søbstad undervisningssykehjem i Trondheim opprettet som et samarbeidsprosjekt mellom kommunen og sykehuset høsten 2002 (15–17). Vi har gjennomført en randomisert, kontrollert studie som viser at behandling i denne intermedieæravdelingen har ført til en reduksjon i reinnleggelser, redusert behov for kommunale hjemmetjenester og reduksjon i antall døde sammenliknet med tradisjonell sluttbehandling i sykehus, uten at det medførte en økning i antall behandlingdager (16, 17).

Formålet med denne artikkelen er å sammenlikne kostnadene ved de to behandlingalternativene (16, 17).

Materiale og metode

Intermedieæravdelingen ved Søbstad undervisningssykehjem ble høsten 2002 oppgradert med mer helsepersonell, kompetanse og utstyr (15–17). Pasientene som ble randomisert til intermedieæravdelingen, fikk kontinuerlig vurdering og behandling av helsetilstand og funksjonsnivå. Det ble ved utreise fra intermedieæravdelingen skrevet tydelige, målrettede opplysninger om pasientens behov direkte til hjemmetjenestene i deres eget journalsystem og egne epikriser til fastlegene, der funksjonsnivå og behovet for fastlegens oppfølging ble konkret beskrevet. Behandlingen i intermedieæravdelingen ble sammenliknet med tradisjonell sluttbehandling i sykehus (16, 17).

Aktuelle for inklusjon i studien var pasienter over 60 år innlagt i sykehuset pga. akutt sykdom eller forverring av en kronisk

Hovedbudskap

- Behandling i intermedieæravdelingen kostet mindre enn behandling i ordinært sykehus
- Kostnadsreduksjonen skyldes lavere behandlingsutgifter i intermedieæravdelingen og færre reinnleggelser i sykehus
- Det var ikke signifikante forskjeller i bruken av kommunale omsorgstjenester

Tabell 1 Beregnede helsetjenestekostnader ved St. Olavs Hospital og i Trondheim kommune¹. Trondheim 2003–05

Sykehusbehandling ²	kr 4 400
Reinnleggelser ²	kr 4 400
Intermediær sykehjemsavdeling ²	kr 1 370
Rehabiliteringsenhet ²	kr 950
Langtids sykehjemsseng ²	kr 835
Hjemmehjelp ³	kr 250
Hjemmesykepleie ³	kr 350

¹ Kostnader beregnet fra regnskapene i 2004 og 2005

² Per døgn

³ Per time

tilstand. De skulle være ferdig utredet og behandling for den aktuelle sykdommen skulle være påbegynt. Det var forventet at de kunne reise hjem etter endt behandling. Dessuten skulle det være nødvendig med sykehusbehandling utover 3–4 dager. Når sykehuset hadde en pasient som var inkludert etter disse kriteriene, drøftet sykepleier ved sykehuset med sykepleier ved sykehjemmet inklusjonskriteriene og aksepterte pasienten til studien. Pasienten ble deretter meldt til Kontor for klinisk kreftforskning ved Det medisinske fakultet, Norges teknisk-naturvitenskapelige universitet, der man foresto fortløpende lukket blokkrandomisering ved bruk av en Access-database (16).

Kostnadsberegninger

Kostnader for sykehusbehandling og for kommunale omsorgstjenester er sammenliknet fra inklusjonstidspunktet (randomiseringstidspunktet) og i 12 måneder etter utskrivning fra intermediæravdelingen eller sykehuset. Alle pasientdata ble innhentet fra pasientjournalene ved sykehuset og i kom-

munen av en av forfatterne (HG) etter forhåndsdefinerte kriterier. Antall dager i institusjon og antall døde ble kontrollert opp mot kommunens og sykehusets pasientadministrative systemer.

De ulike kostnadene for helsetjenester er beregnet som gjennomsnittskostnader per dag for de aktuelle avdelingene ved St. Olavs Hospital og for institusjoner i Trondheim kommune med utgangspunkt i tall fra regnskapene for 2004 og 2005 (tab 1). For intermediæravdelingen er det fortløpende ført eget regnskap. Kapitalkostnader er ikke tatt med. Kostnadene inkluderer medisinsk personell, pleiepersonell, medikamenter og annet forbruksmateriell, laboratoriekostnader, renhold, vask, mat og rehabilitering innen institusjonene. Kostnader til ressurskrevende behandlinger som dialyse, røntgen, pacemaker, intensivbehandling, kirurgi og cytostatika er ikke medregnet i sykehuskostnadene, da bare en del av pasientene fikk denne type behandling. Disse kostnadene ble ikke tatt med for å unngå en overestimering av sykehuskostnadene. Reinnleggelseskostnadene er også beregnet som gjennomsnittskostnader per liggedøgn. Det ble også gjennomført en sensitivitetanalyse, der vi beregnet hvor mye behandlingkostnadene ved intermediæravdelingen måtte øke eller kostnadene i sykehuset måtte reduseres for forskjellen i behandlingkostnad per pasient for aktuell sykdom skulle bli ikke-signifikant.

Ved bortfall av pasienter i løpet av oppfølgingsperioden kan kostnadsberegninger bli misvisende (22). Det var imidlertid ingen bortfall i vår studie, bortsett fra 35 pasienter som døde innen ett år etter inklusjon. Det ble registrert kostnader frem til og med 12 måneder etter utreise eller frem til dødstidspunktet. Totalkostnader for hver enkelt pasient og per observasjonsdag ble kalkulert i henhold til hvor pasienten fikk behandling til enhver tid.

Statistiske analyser

Studien er dimensjonert ut fra primærendepunktet, som var antall reinnleggelser. Styrkeberegningen ble basert på ønsket om å kunne påvise en forskjell på minst 25 % i antall reinnleggelser, med alfa 0,05 og styrke 0,80. For å oppnå dette måtte 130 pasienter inkluderes i studien. Til alle analyser ble SPSS versjon 15.0 for Windows benyttet. Distribusjonen av kontinuerlige variabler ble testet ved å sammenlikne gjennomsnitt, normalitetsplott (Q-Q plots) og ved å bruke Kolmogorov-Smirnovs test på tilpasning til normalfordeling. Totalkostnadene avvek ikke signifikant fra normalfordelingen, mens kostnader per dag gjorde det. Disse ble normalfordelt ved logaritmetransformering (naturlig logaritme), og forskjeller mellom behandlingsstedene ble testet for de transformerte kostnadene. Forskjeller i gjennomsnittskostnader ble analysert med t-test, justeringer i kostnader ble analysert ved ANOVA kovariansanalyser. Statistisk signifikantnivå ble satt til p = 0,05.

Godkjenninger

Alle pasienter fikk muntlig og skriftlig informasjon om studien og samtykket skriftlig i deltakelsen. Studien fulgte anbefalingene i CONSORT-sjekklisten (16). Studien var godkjent av regional komité for medisinsk forskningsetikk og gitt konsesjon av Datatilsynet.

Resultater

Fra august 2003 og til og med mai 2004 ble 142 pasienter inkludert i studien. 70 ble randomisert til sluttbehandling i sykehuset (sykehusgruppen) og 72 til behandling i sykehjemmet (sykehjemgruppen). 64 av pasientene i sykehjemgruppen ble sluttbehandlet i sykehjemmet, da åtte pasienter ikke ble overført fra sykehuset pga. akutt og alvorlig forverring av tilstanden (16). I effektanalysene ble disse åtte behandlet som

Tabell 2 Gjennomsnittskostnader (i norske kroner) per pasient for sykehusbehandling og kommunale omsorgstjenester (med 95 % KI) med ett års oppfølging

	Sykehjemgruppen (n = 72)	Sykehusgruppen (n = 70)	Forskjeller i kostnad (n = 72/70)	P-verdi	Justert p-verdi ¹
Sum kostnader aktuell sykdom	39 650 [30 996–48 304]	73 417 [52 992–93 843]	33 767 [11 995–55 539]	0,003	0,002
Behandlingskostnader ¹	33 417 [26 104–40 729]	39 914 [30 527–49 302]	6 497 [–5 259–18 254]	0,276	0,099
Reinnleggelser etter endt behandling	6 233 [1 136–11 330]	33 503 [15 848–51 157]	27 270 [9 274–45 265]	0,003	0,001
Rehabilitering aktuell sykdom	9 263 [5 286–13 240]	13 124 [7 860–18 388]	3 861 [–2 654–10 377]	0,243	0,246
Sykehuskostnader 1. år ²	55 611 [40 244–70 978]	55 377 [32 619–78 135]	–234 [–23 899–29 430]	0,838	0,802
Samme sykdom	24 261 [11 454–37 069]	21 749 [9 324–34 174]	–2 513 [–20 213–15 187]	0,779	0,879
Annen sykdom	31 350 [20 794–41 906]	33 629 [15 805–51 452]	2 279 [–18 117–22 674]	0,826	0,882
Omsorgstjenester 1. år	52 047 [36 968–67 126]	40 343 [30 725–49 960]	–11 705 [–29 545–6 136]	0,197	0,343
Hjemmetjenester 1. år	28 864 [23 717–34 012]	29 595 [24 586–34 063]	731 [–6 393–7 854]	0,840	0,978
Sykehjem 1. år	23 183 [7 868–38 498]	10 748 [2 053–19 441]	–12 435 [–30 025–5 154]	0,164	0,331
Gjennomsnitt per observasjonsdag	606 [450–761]	802 [641–962]	196 [–25–417]	0,082	0,026

¹ Justert for alder, kjønn, diagnose og funksjonsnivå

² Kostnader for sluttbehandlingen på intermediæravdelingen og sykehuset

³ Eksklusive akutte, ikke planlagte reinnleggelser innen 60 dager

en egen gruppe, mens de er inkludert i sykehjemgruppen i alle behandlingsintensjonsanalysene. Alle sammenlikninger er basert på behandlingsintensjonsanalyser. Ved randomiseringstidspunktet var sykehjem- og sykehusgruppen sammenliknbare med henblikk på dager i sykehus før randomisering, alder, diagnoser, funksjonsnivå, kjønn, ekteskapsstatus og familiært nettverk (16).

Kostnader

Kostnadene ved all behandling av sykdommen som førte til innleggelsen, i sykehus, korttidssykehjem og rehabiliteringsinstitusjoner, inklusive kostnadene for reinnleggelser innen 60 dager etter utskrivningen, var for sykehjemgruppen i gjennomsnitt per pasient kr 73 417 (95 % KI kr 52 992–93 843) og for sykehjemgruppen kr 39 650 (95 % KI kr 30 996–48 304), $p = 0,002$ (tab 2). Det var ikke statistisk signifikant forskjell i behandlingstidspunktet for den aktuelle etterbehandlingen i sykehuset sammenliknet med intermedieæravdelingen ($p = 0,099$). Kostnadene ved reinnleggelser etter utskrivning var lavere for sykehjemgruppen enn for sykehusgruppen ($p = 0,001$). Det var ikke signifikante forskjeller i sykehuskostnader i løpet av oppfølgingsåret mellom sykehjem- og sykehusgruppen (tab 2). Kostnadene til langtidsopphold i sykehjem var høyest i sykehjemgruppen, men forskjellen var ikke statistisk signifikant.

Samlede gjennomsnittlige kostnader per observasjonsdag og per pasient var kr 802 (95 % KI kr 641–962) i sykehusgruppen sammenliknet med kr 606 (95 % KI kr 450–761) i sykehjemgruppen ($p = 0,026$, $p = 0,018$ ved transformering (ln) av kostnadene per dag) (tab 2).

Sensitivitetsanalyse

Kostnadene måtte økes med 99 % per pasient per behandlingsdag i intermedieæravdelingen eller reduseres med 54 % i sykehuset for at forskjellene ikke lenger skulle være statistisk signifikante ($p < 0,05$).

Diskusjon

Slutt- og etterbehandling ved intermedieærheten ved Søbstad sykehjem viste seg å koste mindre enn tradisjonell sluttbehandling ved St. Olavs Hospital. Besparelsene skyldtes hovedsakelig reduksjon i antall reinnleggelser og antall dager reinnlagt (16), i tillegg bidro lavere kostnader per behandlingsdag ved intermedieærheten. Effekten av at flere i sykehjemgruppen klarte seg uten kommunale omsorgstjenester etter ett år er marginal og ble oppveid av at flere i denne gruppen ble innlagt på langtidsopphold i sykehjem (17). Det var ingen forskjell i bruk av sykehjemstjenester, unntatt reinnleggelser, i løpet av oppfølgingstiden gruppene imellom (17).

Styrken er at dette var en randomisert, kontrollert studie og at oppfølgingen av pasientene er komplett (16, 17). Kostnadsbe-

regningene i form av gjennomsnittskostnader per behandlingsdag eller time kunne vært mer presise. Det ideelle hadde vært å registrere fortløpende medgått tidsbruk av ulike personellkategorier, legemidler, prosedyrer og inngrep, mat m.m. for hver pasient i den enkelte avdeling, da ressursinnsatsen varierer betydelig fra dag til dag og fra pasient til pasient. I praksis var dette umulig. Kostnadene er, spesielt sykehuskostnadene, gjennomgående underestimert, da mange av de innlagte pasientene gjennomgikk kirurgiske inngrep og lå i intensivhet flere ganger i løpet av observasjonsåret. Gjennomsnittskostnader per dag og per time basert på regnskapstall fra kommunen og sykehuset ga derfor sannsynligvis et riktig estimat av kostnadene for sammenlikning mellom gruppene. Kapitalkostnader var ikke inkludert, da dette var vanskelig å få frem for sykehuset. Uansett ville kapitalkostnadene vært høyere ved sykehuset enn i kommunen.

Vi tror at det ved planlegging av nye behandlingstiltak er viktig at det vurderes om tiltakene er reelle alternativer eller om de bare vil fungere som supplement til allerede eksisterende tiltak. Spesielt gjelder dette en så marginalt fungerende pasientgruppe som den som var inkludert i denne studien (5, 6, 16, 17). Nye behandlingstilbud må ikke bare være ren avlastning for presset på sykehussengene. Med de siste årenes kostnadsvekst også innen kommunale omsorgstjenester (1) er det nødvendig at nye tilbud planlegges og gjennomføres i tett samarbeid mellom primær- og spesialisthelsetjenesten – slik at behandlingstilbudene kan gi økonomisk gevinst i forhold til investerings- og driftskostnader, i tillegg til likeverdig eller bedre pasientbehandling.

Vi mener at grunnen til at intermedieæravdelingen på Søbstad fungerer som et alternativ til ordinær sluttbehandling i sykehus for pasientene i denne studien, i hovedsak handler om den strukturerte og systematiske kommunikasjonen med ansvarspersoner i pasientens sosiale nettverk og med kommunenes helse- og omsorgstjenester – foruten enhetens helsefaglig kompetanse og ressurser.

Det bør gjennomføres flere studier med flere pasientgrupper fra ulike steder i landet for å utvikle kriterier for utvelgelse av dem som kan ha faglig nytte av et behandlingstilbud på intermedieært nivå – som samtidig er kostnadseffektivt.

Litteratur

1. Helseutgifter etter type tjeneste. 1997–2006. Milioner kroner. Løpende priser. Oslo: Statistisk sentralbyrå, 2007. www.ssb.no/emner/09/01/helsesat/tab-2007-04-26-02.html [18.7.2007].
2. Døgnopphold og liggedager, etter kjønn og alder. 2004–2006. Oslo: Statistisk sentralbyrå, 2007. www.ssb.no/emner/03/02/pasient/tab-2007-04-20-04.html [18.7.2007].
3. Jagger C, Matthews R, Spiers N et al. Compression or expansion of disability? Forecasting future disability levels under changing patterns of diseases. Final report. KF 117 02/06. Leicester: University of Leicester, 2006.

4. Scenario 2030. Sykdomsutviklingen for eldre frem til 2030. IK 2696. Statens helsetilsyns utredningsserie. Oslo: Statens helsetilsyn, 2000.
5. Yang Z, Norton E, Stearns S. Longevity and health care expenditures. The real reasons older people spend more. *J Gerontol B Psychol Sci Soc Sci* 2003; 58: S2–10.
6. Gray A. Population ageing and health care expenditure. *Aging Horizons* 2005; 2: 15–20.
7. Nord E, Hjort PF. Helsetjenesteforbruket i siste leveår. Andel av totalt helsetjenesteforbruk. *Tidsskr Nor Lægeforen* 1988; 108: 3265–7.
8. Hensher M, Fulop N, Coast E et al. Better out than in? Alternatives to acute hospital care. *BMJ* 1999; 319: 1127–30.
9. Eriksen BO, Kristiansen IS, Nord E et al. The cost of inappropriate admissions: a study of health benefits and resource utilisation in a department of internal medicine. *J Intern Med* 1999; 246: 379–87.
10. Hakkaart-van Roijen L, Moll van Charante EP, Bindels PJ et al. A cost study of a general practitioner hospital in the Netherlands. *Eur J Gen Pract* 2004; 10: 45–9.
11. Gjørup T, Rasmussen L, Andersen JS. Bedre medisinske forløp. *Ugeskr Læger* 2005; 167: 2434–8.
12. Intermediate care. Guidance for commissioners and providers of health and social care. BGS Compendium Document 4.2. London: British Geriatrics Society, 2004.
13. Donald IP, Jay T, Lidsell J, Foy C. Defining the appropriate use of community hospital beds. *Brit J Gen Pract* 2001; 51: 95–100.
14. Aaraas I, Forde OH, Kristiansen IS et al. Do general practitioner hospitals reduce the utilisation of general hospital beds? Evidence from Finnmark County in North Norway. *J Epidemiol Community Health* 1998; 52: 243–6.
15. Garåsen H, Kaasa S, Røstad T et al. Spesialiserte korttidsplasser i sykehjem – Trondheims-modellen. *Tidsskr Nor Lægeforen* 2005; 125: 1503–5.
16. Garåsen H, Windspoll R, Johnsen R. Intermediate care at a community hospital as an alternative to prolonged general hospital care for elderly patients: a randomised controlled trial. *BMC Public Health* 2007; 7: 68.
17. Garåsen H, Windspoll R, Johnsen R. Intermediate care at a community hospital for elderly patients: 12 months follow-up of a randomised controlled trial. *Scand J Pub Health*, akseptert for publisering.
18. Greene J, Young J, Forster A et al. Effects of locality based community hospital care on independence in older people needing rehabilitation: randomised controlled trial. *BMJ* 2005; 331: 317–22.
19. Round A, Crabb T, Buckingham K et al. Six months outcomes after emergency admission of elderly patients to a community or a district general hospital. *Fam Pract* 2004; 21: 173–9.
20. Griffiths P, Edwards M, Forbes A et al. Effectiveness of intermediate care in nursing-led in-patient units. *Cochrane database Syst Rev* 2007; (2): CD002214.
21. Walsh B, Steiner A, Pickering RM et al. Economic evaluation of a nurse led intermediate care versus standard care for post-acute medical patients: cost minimisation analysis of data from a randomised controlled trial. *BMJ* 2005; 330: 699.
22. Young TA. Estimating mean total cost in the presence of censoring: a comparative assessment of methods. *Pharmacoeconomics* 2005; 23: 1229–42.

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Helge Garåsen, Rolf Windspoll and Roar Johnsen

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