Chapter 8.

General Discussion

8.1 Introduction

The aim of the present study was to investigate the effect on outcome and costs of accelerated discharge of elderly hip fracture patients from hospital. We will answer and discuss the research questions one by one. Then, we will discuss the possible consequences of early discharge for waiting lists and misuse of hospital beds and nursing home beds and suggest to organize the care in a "hip fracture service". Finally, we summarize the general discussion in conclusions and recommendations.

8.2 Research questions

What is the outcome of elderly hip fracture patients in regard to mortality, recovery of function and quality of life?

The average age of the patients included in our study was high (83 years) and a large proportion (40%) was already institutionalized before fracture. In most previous studies, lower average age and more patients coming from home were reported. Both age and pre-fracture residence strongly predict mortality and functional outcome (see chapter 2, literature review). This could explain the poor recovery of function and relatively high mortality in our study population.

At 4 months after fracture, 19% of all patients in our study had died. This is in line with the range of 12-24% death rates previously reported.[1-5] Mortality was not confined to the hospital stay but mainly occurred after hospital discharge, e.g. in the nursing home. As expected, higher age, reduced cognitive status, and more comorbidities at hospital admission predicted mortality. Main causes of death were pneumonia, heart failure, myocardial infarction and stroke. Nearly one fifth of all deaths were due to " failure to thrive" (dehydration/cachexia) in demented patients. The outcome with regard to survival of patients, who had all 4 risk factors at hospital admission, was very poor. Of the 22 psychogeriatric patients in our study, who fractured their hip in the nursing home, 8 patients (36%) died within 4 months. Of the 6 nursing home patients, who in addition to dementia and hip fracture, had 2 or more comorbid conditions, 4 died within 4 months. Institutionalized patients, who

in addition to dementia had other comorbid conditions that reduced mobility and function before their hip fracture should receive conservative treatment with sufficient pain relief. These patients have a poor prognosis with regard to survival and recovery of function and may benefit more of conservative treatment and sufficient pain relief. A Cochrane Review revealed that for all patients the limited available evidence from randomised trials does not suggest major differences in long-term outcome between conservative and operative management programmes for extracapsular femoral fractures, but operative treatment appears to be associated with a reduced length of hospital stay and improved rehabilitation.[6]

At 4 months, only 18% of patients in our study had achieved their pre-fracture ADL level (as measured by the Rehabilitation Activities Profile) and 36% their previous walking ability. This outcome is similar or worse than that reported previously.[3,7-12] Higher age, reduced function before fracture, and reduced cognitive status (see chapter 2, literature Review) predict reduced function after fracture. In addition to these characteristics, we found the number of comorbidities at hospital admission to be predictive for the recovery of function at 4 months after fracture.
The health-related quality of life instruments (Nottingham Health Profile and COOP/WONCA carts) used in the study showed overall improvement in health-related quality of life between 1 week and 4 months after hospital admission. Unfortunately it was not possible to assess retrospectively the scores before the hip fracture. Therefore, we had to use reference values from literature for comparison. For the Nottingham Health Profile these were reported in a UK general population, divided in age and gender groups.[13] For the COOP/WONCA charts, Dutch general population reference values were used.[14] It was not surprising that the functional dimensions of these instruments showed poor recovery. At 4 months postoperatively, significant differences with the reference population were found in physical mobility (NHP), social isolation (NHP), physical fitness (C/W), and daily activities (C/W). Significant differences were also found in emotional distress (emotional reactions-NHP, feelings-C/W) and pain. For the COOP/WONCA charts, no reference values are available in regard to pain. At 4 months 20% of patients experienced severe to very severe pain (32% at 1 week and 26% at 1 month). The 4-month scores of the NHP dimension pain did not differ from the reference population. Apparently, pain is a common phenomenon in the aged (> 80 years). At 1 week and 1 month after hospital admission, patients experienced more pain ($p < 0.001$) than the reference population. We agree with other researchers [15] that the observation and

treatment of pain complaints after surgery for hip fracture requires more attention.

What are the effects of early discharge from hospital on mortality, recovery of function and quality of life?

We found that an early discharge policy of elderly hip fracture patients did not affect outcome in regard to survival, function, and quality of life at 4 months after hospital admission.

In the early discharge group, the hospital stay was reduced from on average 26 days to 13 days by using a decision protocol for discharge that started 5 days postoperatively, by speeding up procedures for discharge home or transfer to a nursing home and by increasing the availability of beds on the rehabilitation ward in an nursing home.

This intervention resulted in more patients going to a rehabilitation ward in a nursing home. Both hospital and nursing home provided medical care and physiotherapy. However, differences existed in primary care objectives. In the hospital, postoperative surgical care was provided and the physiotherapist tried to restore the function of the operated hip. In the nursing home, geriatric care was provided, aimed at the recovery of the ability to perform (instrumental) activities of daily living. In contrast to the hospital, the nursing home provided multidisciplinary care with weekly meetings of the multidisciplinary team. In the hospital patients received physiotherapy (2 x per day 5-10 minutes) under supervision of the ward physician. In the nursing home physiotherapists (2,4 full time equivalent (fte) for 30 patients with 20-30 min physiotherapy per day per patient), occupational therapists (0,5 fte) and social workers (0,7 fte) helped to ensure patients were rehabilitated under supervision of a physician trained in geriatric medicine (0,5 fte). Registered nurses in the hospital and nursing assistants in the nursing home provided nursing care (both approximately 90 minutes per day per patient). Despite this more intensive rehabilitation, the early discharge from hospital had no effect on survival, function, or quality of life at 4 months. Disappointing results of combined orthopedic-geriatric care have been previously reported.[7,9,10,16-18] The authors of two systematic reviews of geriatric rehabilitation and coordinated multidisciplinary care after hip fractures concluded that no conclusive evidence existed about the long-term improvement of function, morbidity, or quality of life in rehabilitation programs.[19,20]

While our results support this conclusion, it was shown that one month after hip fracture, early discharged patients coming from home showed some signs of better recovery. Their walking ability was better ($p = 0.05$) and the scores on the RAP-communication- mobility-personal care ($p= 0.06$) and RAP-occupation ($p = 0.08$) showed a trend in favor of the early discharged patients. Similar trends of better recovery at 1 month were found for all (including the pre-fracture institutionalized) patients on the Nottingham Health Profile pain dimension ($p = 0.09$) and the energy dimension ($p = 0.05$). With a greater number of patients, these differences could have reached statistical significance. Therefore, it is possible that the multidisciplinary approach and the extra efforts of therapists in the nursing home have some influence on the speed of recovery.

The two groups of patients showed at 4 months similar health-related quality of life as measured by NHP and COOP/WONCA charts. However, we cannot exclude that other quality of life concepts such as "happiness" or "satisfaction" are related to the change of environment (hospital vs. nursing home) in regard to where patients were rehabilitated. In retrospect, it would have been wise to measure satisfaction differences between groups.

Finally, although the residence of patients after hospital discharge shifted, the early discharge had no influence on total institutional stay and at 4 months the residence of "usual management" and ' early discharge" patients was similar.

In conclusion, early discharge did not influence the outcome of elderly hip fracture patients in an unfavorable way.

Does early discharge result in a reduction of costs?

Because most costs were made during hospital (conventional management 47% and early discharge 32% of total) or nursing home (32% and 44% respectively) we will first discuss institutional stay.

The length of hospital stay of hip fracture patients in the Netherlands is relatively long (23 days in 1998). Much shorter hospital stays were achieved in Sweden and the US (11-12 days). However, the length of hospital stay depends on the place and method of rehabilitation. When patients are transferred from the acute hospital to rehabilitation wards or nursing homes, total institutional stay should be compared together with the proportion of patients who return to their previous living situa-

tion. The intervention in our study resulted in, on average a two-week shorter stay in the acute hospital, but the average total institutional stay (hospital + nursing home) until discharge remained the same (38 days vs. 34 days, p = 0.5). Also, the proportions of patients who were back home at 4 months after fracture were similar. Of patients coming from home, 63% were back home, 21% stayed in the nursing home, and 4% were in an old people's home. These figures are comparable with those in the US, where patients are discharged from hospital after a stay of approximately 12 days, but a large proportion (60-70%) is rehabilitated in nursing homes with an average length of stay of 40 days.[21] We found similar lengths of nursing home stay in our study. A larger proportion of patients discharged directly home from hospital (80%) with relatively short stays (12-20 days) were reported in Lund, Sweden [22,23] and in Peterborough, UK.[4] Both centers, however, developed special "hip- fracture services" with extensive physiotherapy and nursing care at home.

Cost calculations based on average charges per (hospital or nursing home) day will overestimate potential savings.[24-27] Therefore, we estimated the real costs from a societal perspective measured as the value of investments in personnel, equipment, materials, housing and overhead. The real hospital costs per inpatient day decreased after day five. When we had used average charges per day for hospital (€ 300), nursing home (€ 130), and old people's home (€ 60) the savings would amount to approximately € 3000 per patient. Even when corrected for the more re-admission days in the early discharge group, the savings would be € 2000 per patient. With an incidence of 17.000 hip fractures per year in the Netherlands, total costs savings would amount to € 34 million per year. If we assume that our real cost estimation of € 1000 per patient could be confirmed in a larger study, this would imply a cost saving of € 17 million per year.

We found a real cost saving of 7% by early discharge. Explanations why the cost saving was not higher are:

- The early discharge caused a shift in costs from the hospital to the nursing home while total institutional stay did not differ between groups;
- The real costs per day after day 5 in hospital did not differ greatly from costs per day in the nursing home;
- The early discharge policy caused the first 5 days postoperatively to be more expensive probably because the prospect of early discharge caused physicians to speed up diagnostic and laboratory procedures;

- More re-admissions to hospital occurred in the early discharge group;
- There was a large variation in costs per patient.

We found the average real costs per patient per day in the nursing home (€ 130-140) to be approximately the same as the charges in the Dutch health care system. Therefore, a reduction of the present hospital stay of 23 days to 13 days with consequently earlier discharge to nursing homes does not seem to necessitate extra financing of the nursing homes. Apparently, the rehabilitation and care of hip fracture patients does not need more time from the nursing, medical, and therapeutic staff than the care of other admitted patients. Although the hip fracture patients received more physiotherapy than the usual admitted nursing home patient, these other patients probably received more in the way of other forms of therapy such as occupational therapy and activity training. However, a more accelerated discharge than the present one, for instance with an average hospitalization of 5-6 days, will increase the average costs per day in the nursing home. These earlier discharged patients will need more nursing and medical care and will incur more costs because of laboratory and other diagnostic procedures.

We calculated variable hospital costs from day 5 until discharge to be € 146 per day (Table 1). Fixed costs (housing and overhead) were € 118 per day. Assuming nursing homes have to make similar variable costs to take care of these patients, daily costs per patient would then amount to € 74 (= fixed nursing home costs) + € 146 = € 220. To stimulate nursing homes to admit these patients 5-6 days after surgery an extra reimbursement of € 90 (€ 220 minus € 130) per day per patient for 6 days seems reasonable. Moreover, nursing homes should be compensated for the necessary reservation of beds to guarantee admission and the extra administrative costs because of the increased turnover of patients.

Table 1.
Average hospital and nursing home real costs and charges per day (early discharge, average stay 13 days in hospital) in Euros

	Hospital	Nursing home
Fixed costs	118	74
Variable costs	146	60
Total costs	264	134
Charges per day	235-350	130

The real costs for the care of hip fracture patients in

old people's homes (€ 120) were twice the charges per day (€ 60). Health practitioners such as general practitioners and physiotherapists are not included in these charges but these incurred only very few costs (€ 3 per day). With a more accelerated discharge policy, the costs of health care professionals will increase. The costs of rehabilitating hip fracture patients in elderly homes then approach those incurred in nursing homes. Preferably these patients should be admitted to rehabilitation wards of nursing homes where they could be rehabilitated according to a coordinated rehabilitation program (similar to the Stroke Service). This could improve the outcome.

The incremental costs (total costs minus average pre-fracture incurred costs) of a hip fracture in our study amounted to € 10.821 for conventionally discharged and € 9.576 for early discharged patients. This is in agreement with reported incremental costs in the Netherlands by de Laet et al.[28] but lower than reported in studies from the US [29] and Sweden.[30] Total costs were € 15.338 for conventionally managed and € 14.281 for early discharged patients up to 4 months after surgery. Therefore, the prevention of hip fractures is not only important to prevent mortality and morbidity after hip fracture but will also substantially reduce health care costs. In the light of these facts the recent development of hip protectors seems promising [31] although their effectiveness has only been proven for a selected (institutionalized) population at high risk sustaining a hip fracture and is not known beyond this group. Compliance, particularly in the long term, is poor for people living at home. Moreover, it is possible that wearing the hip protector improves activity and reduces the fear of falling resulting in more hip fractures.

Because of the early discharge, the extramural health care costs at home (reflecting investment of nursing care at home, general practitioners, and physiotherapists) slightly increased. Surprisingly, this was not found for informal care. Probably, the rehabilitation at the nursing home and the careful discharge planning resulted in less demand of informal caregivers. This influence on the demand of caregivers at home is important to keep in mind when planning early discharge from hospital and nursing home.

What complications occur after surgery for hip fracture and does early discharge change the number and nature of the complications?

Hip fracture patients experience many complications both inside and outside the hospital. We registered on average 3 complications per patient in 4 months. Most of these (91%) concerned general medical complications. Prevention of local surgical complications remains important because re-operation (38%) and functional impairment (41%) followed a large proportion of these complications. Improvement of surgical technique and procedures could result in reduction of surgical complications. This belongs to the domain of orthopedic surgeons and quality improvement of hospital care.

The early discharge had no influence on the number and nature of complications but merely shifted the location of occurrence from the hospital to the nursing home. Patients in the conventional discharge group experienced 64% of all complications during their hospital stay, 24% in the nursing home, and 14% at home or old people's home. The figures for early discharged patients were 45%, 45%, and 10% respectively.

After the direct (postoperative) period, residents, general practitioners or nursing home geriatricians take over the medical care of these frail elderly patients. In this postoperative period, the prevention of complications such as urinary tract infections, pressure ulcers, pulmonary infection, and psychiatric complications, becomes important.
We found high incidences of urinary tract infections (in 45% of patients). More research is needed to establish whether disturbed bladder function with urine retention in these patients could have been the cause of the frequent postoperative urinary tract infections. We registered urinary tract infection as a complication if patients were treated with antibiotics. However, we do not know how the infections were diagnosed: e.g. on the basis of the presence of bacteriuria or also on the basis of symptoms? This diagnostic uncertainty could explain the variety of incidences, reported in other studies. Although the infections had few consequences for the functioning of patients, prevention certainly would reduce complaints, temporary illness, and delay of rehabilitation. To prevent urinary tract infections, the use of prophylactic antibiotics remains controversial.[32] Bladder catheterization increases the incidence of urinary tract infections and should be avoided as much as possible.[33]

Early mobilization and adequate nursing attention in regard to timely and sufficient bladder emptying could further reduce the incidence of urinary tract infections.

Pressure ulcers were frequent (in 27% of patients). Half of these were diagnosed within 8 days after surgery. It is probable that a substantial number of these pressure ulcers had already developed before surgery. Early mobilization, frequent turning (also preoperatively in the emergency department), treatment of anemia, and adequate food intake, are among the prophylactic measures which should be employed to prevent this painful and disabling complication.

An especially serious (and often lethal -- 50% in our study) postoperative complication after hip fracture is pneumonia. Prevention of pulmonary complications in elderly hip fracture patients requires careful preoperative instruction in coughing and breathing exercises, appropriate management of any preoperative chest infection, timely surgery, short operation, early postoperative mobilization, good oral hygienic care and prevention of aspiration, and vigorous postoperative physiotherapy.[34]

Finally, prompt return of psychogeriatric patients to the nursing homes and early proactive geriatric consultation could reduce psychiatric complications such as acute confusion (delirium).[35]

Which measurement instruments are appropriate to measure recovery in function and quality of life?

We prospectively evaluated health-related quality of life, including functioning, until 4 months after hip fracture. We used two interviewer-administered instruments (the Rehabilitation Activities Profile (RAP) and the Barthel Index (BI)) that focus on functional status, and two self-assessment instruments (the Nottingham Health Profile (NHP) and the COOP/WONCA charts) that additionally include psychological and social health domains. The score distribution, internal consistency, construct validity, and sensitivity to change over time, were investigated. We showed that, for research purposes (i.e. comparisons at group level), the RAP performs well in the assessment of (instrumental) activities of daily living and the NHP in the assessment of other health-related quality of life dimensions such as pain, emotional distress, and energy. The BI also assesses functional recovery but in contrast to the RAP, does not measure instrumental activities of daily living. Moreover, its sensitivity to detect

change over time and minor disability appeared to be lower. Contrary to our expectations, the pictograms of the COOP/WONCA charts did not help mildly cognitively impaired patients to complete the questionnaire. The NHP covered a wider range of psychological health dimensions and had better psychometric properties than the COOP/WONCA charts. Therefore, we recommend the use of the RAP and the NHP for the follow-up research of hip fracture patients.

Good psychometric properties for comparisons at patient group level do not necessary mean that a measure is also suitable for individual clinical follow-up of elderly hip fracture patients. The requirements of a measure depend on the purpose of the individual clinical follow-up. The use of a measure as a basis to make clinical decisions, for instance, requires higher demands of reliability than its use as a basis to discuss with a patient his/her recovery of or decline in health-related quality of life. Also, other health-related quality of life instruments such as the Short Form 36 may actually be more appropriate in the follow-up of hip fracture patients at group level. More research is needed to answer these questions. Furthermore, as previously mentioned, this type of research should also include satisfaction (with physical and emotional environment) measurement.

8.3 Effect of accelerated discharge on the misuse of hospital and nursing home beds (so-called "waiting lists" and "wrong" beds).

In 1994, van Vught et al [36] focused attention on the wrong-bed problem of hip fracture patients in the Netherlands. Especially the waiting for admission to somatic and psychogeriatric nursing homes was too long. The authors proposed that optimally patients should stay on average 9 days in hospital stay with a hip fracture. In the UK, Robbins et al [27] found that 28% of the hip fracture patients admitted to hospital were awaiting discharge after medical and surgical care was complete. These patients occupied surgical and orthopedic beds. Additionally, the hospital environment was often not the most appropriate environment for the rehabilitation of these frail elderly patients. Early discharge of hip fracture patients could facilitate the admission of more patients for treatment in the hospital without increasing the capacity for hospital bed provision. Table 2 shows that an accelerated discharge of 13 days and 17 days could free capacity for 20.000 and 27.500 respectively for elective surgery or treatment of hip fracture.

In 2000, 32.000 patients were waiting for orthopedic ward admission and 27.000

Table 2.
Proven and hypothetical effects of early discharge of elderly (> 65 years) hip fracture patients on capacity of hospitals and nursing homes in the Netherlands.

		Discharge		
		Conventional	Early (13 days)	Early (9days)
HOSPITAL	Number of hip fracyures in 2000	14.760	14.760	14.760
	Average stay	26 days	13 days	9 days [36]
	Number of bed-days	383.760	191.880	132.840
	Capacity (beds)	1168	583	364
	Extra number of patients for elective surgery/hip fracture with capacity of 1168 beds*	----------	20.032	27.531
NURSING HOME	Patients admitted to rehabilitation wards	5.748	8.996	8.996
	Average stay #	43 days	39 days	44 days
	Number of bed-days	247.164	350.844	394.504
	Capacity (beds)+	752	1066	1200

* with a bed occupancy rate of 90% and an average stay of 9.6 days for orthopedic wards
#: Average stay of discharged patients < 4 months; % of remaining (not successfully rehabilitated) patients was similar for conventional and accelerated discharge.
+: bed occupancy rate of 90%
[36] : van Vugt et al. 1994

patients for admission to surgery wards in the Netherlands with waiting times of 9-12 weeks.[37] The accelerated discharge of hip fracture patients could therefore greatly contribute to the reduction of waiting lists. This increased turnover in the hospital can only be achieved of course if there is sufficient theatre capacity,

sufficient medical and nursing staff in the hospital, and increased nursing home capacity available for rehabilitation (Table 2). This is in addition to the capacity required for patients already admitted in the nursing home before the fracture (n = 2200) and the capacity required for remaining patients because their rehabilitation failed (n = 2500). With an optimal average hospital stay of 9 days, the total institutional stay (hospital + nursing home) of hip fracture patients will probably not increase. Currently, 752 nursing home beds are required for the rehabilitation of elderly hip fracture patients. The extra capacity (beds) needed to optimally rehabilitate the additional number of patients are 550 beds, divided between 18 combined somatic-psychogeriatric nursing homes with rehabilitation wards of 30 beds. Because a large proportion of hip fracture patients is cognitively impaired, the admission of these patients should not be confined to somatic rehabilitation wards. Psychogeriatric beds (with a specialized rehabilitation program) should also be available. If this increased capacity involves a reduction of the number of available chronic somatic beds, it will result in about 300 less (1% of total) chronic somatic patients that could be admitted to Dutch nursing homes per year or an increase in average waiting times of a few days. Moreover, if more orthopedic hospital beds could be made free, more patients could be operated sooner for arthritis of the hip or knee, therefore helping to prevent dependence and nursing home admittance. We therefore advocate the early discharge of hip fracture patients.

8.4 Hip Fracture Service

The average hospital stay could possibly be even shorter than 13 days without compromising the outcome through organizing care facilities similar to that of a Stroke Service. This service (stroke unit) is characterized by coordinated multidisciplinary rehabilitation, programs of education and training in stroke, and specialization of medical and nursing staff, resulting in long term reductions in death rates, reduced dependency and need of institutional care.[38] Recently, the results of 3 stroke services in the Netherlands were reported. The stroke service in Delft proved to be the most successful in terms of improved health outcome, lower costs, increased feelings of satisfaction among patients and caregivers, and reduced length of stay in the hospital.[39] Important conditions for this success were admission guarantee to hospital and nursing home, care according to a protocol, concentration of stroke patients in hospital and nursing home, multidisciplinary meetings, organization of after-care at home, and a "transmural" patient file.[40]

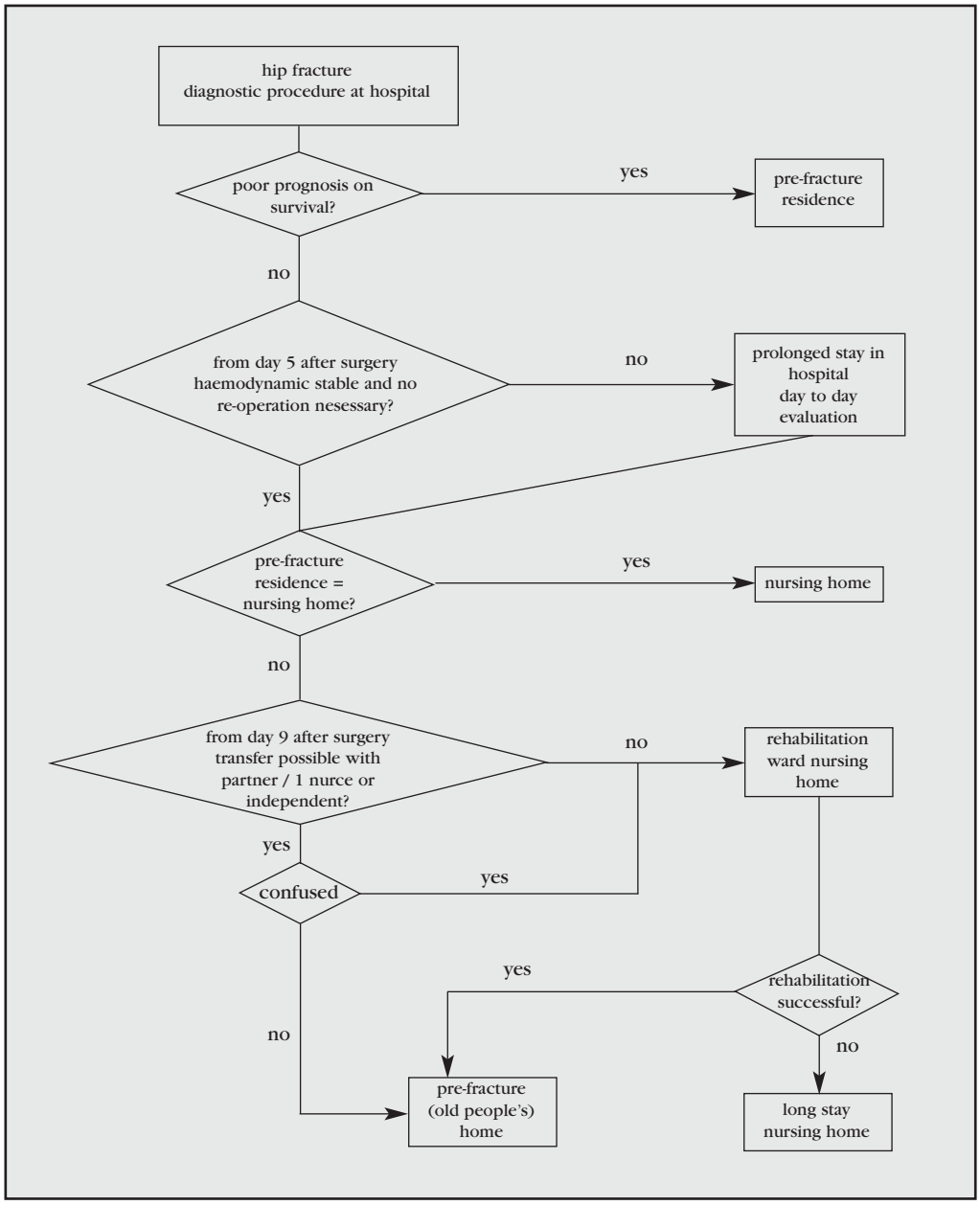
A similar project for hip fracture patients was developed in Peterborough (UK) with early operation by a designated theatre team and admission to a hip fracture ward where patients stay for their entire in-patient rehabilitation.[4] After surgery, early discharge of patients was encouraged and wherever possible the hospital-at-home community service was used. All patients were followed-up in a hip fracture clinic. This service resulted in a reduction of length of hospital stay, an increase in the proportion of patients discharged directly home and reduction in mortality rate over a period of 11 years after the introduction of the service. Other examples of hip fracture services are a multidisciplinary team caring for patients both in the hospital and at home in New Zealand [41] and a hip fracture unit in Sweden where patients remain until they could return home or until no further progress was recorded.[42] Both services resulted in shorter hospital stays and reduced costs.

In accordance with already established stroke services, hip fracture services could lead to better outcome in the Netherlands. Such a hip fracture service should include:

- prompt admission guarantee to a hip fracture unit in the hospital;
- concentration of hip fracture patients in the hospital;
- a designated hip fracture team of anesthesiologists, orthopedic surgeons, geriatrician, and physiotherapists;
- a discharge protocol with a fixed decision moment (5 days postoperatively, see Figure 1) where: patients coming from a nursing home should be discharged as soon as possible back to the nursing home; patients not able to make a transfer from bed to chair should be discharged to a rehabilitation unit of a nursing home; every patient able to make a transfer should be discharged home with additional nursing care and physiotherapy at home; every patient able to make a transfer with the help of one person should be discharged home when a partner is willing and able to give this help- or back to the old people's home. When discharge back to home or old people's home cannot be realized within 9 days postoperatively, these patients should be discharged to the nursing home. Confusion (delirium, cognitive deterioration) nearly always hampers early return to home. Therefore, all confused patients should be discharged to rehabilitation wards of nursing homes;
- weekly multidisciplinary meetings including nursing staff, medical staff,

physiotherapists and nursing home geriatrician, resulting in care according to protocol and efficient discharge policy;

- admission guarantee to rehabilitation units (both somatic and psychogeriatric) in nursing homes;
- transmural patient file going with the patient from one residence to the other;



- coordinated home care (nursing, physiotherapy, and medical) and the use of rehabilitation day-care centers after hospital or nursing home discharge;
- simplifying of (care) indication procedures: (orthopedic) surgeon indicates institutional care after discharge, and the regional indication committee warrants a maximum of 100 days to the nursing home for the rehabilitation.

8.5 Recommendations and conclusions

Recommendations for quality of care

- Emotional distress and pain after hip fracture are common and need more attention. We recommend frequent pain assessment and adequate treatment.
- Geriatric expertise is needed to prevent, diagnose, and treat the frequent general medical complications such as urinary tract infections, pressure ulcers, pulmonary complications, and delirium after hip fracture.
- To stimulate specialized nursing homes to admit hip fracture patients after a shorter hospital stay than on average 13 days, reimbursement of € 20 per day per patient (in addition to the usual charges) for the first six weeks of admission seems reasonable.
- The hip fracture patients should be concentrated on a (orthopedic) rehabilitation ward in the hospital and nursing home and the rehabilitation should be coordinated in a hip fracture service.
- In the follow-up of hip fracture patients the use of the Rehabilitation Activities Profile and the Nottingham Health Profile is recommended.

Recommendations for future research

The investigation of:

- The effect of a hip fracture service on length of stay, residence, function (as assessed by the RAP), quality of life (NHP), complications, and satisfaction. Preferably this should be studied in a randomized design;
- The effects of further shortening of hospital stay (on average < 9 days) on real costs. The study population should be sufficiently large enough to reach statistical significance, in view of the large variation in costs between patients;
- The performance of the RAP in the individual clinical follow-up of hip fracture patients;
- The benefit in terms of comfort/quality of life to operate on very old, severely

demented, long-term institutionalized hip fracture patients with multiple comorbidity.

Conclusions

1. A hip fracture has serious consequences for survival and for recovery of function and quality of life.
2. Early discharge from the hospital to nursing homes with rehabilitation facilities does not clearly improve the outcome although it does not worsen the outcome.
3. In accordance with developments in the US and Sweden, shorter lengths of stay in the hospital (average 9 days) should be possible in the Netherlands.
4. Early discharge caused in the present study a real cost saving (7%), which did not reach statistical significance.
5. Many medical complications occur after surgery for a hip fracture. Early discharge does not change the number or nature of these complications but merely shifts the location of occurrence from the hospital to other locations.
6. The Rehabilitation Activities Profile is an appropriate instrument to measure functional recovery after hip fracture. To measure other quality of life dimensions, such as pain, emotional condition, and energy, the Nottingham Health Profile performs well.

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