Care for hip fractures!

Improving hip fracture patient care

Figure 1 Dynamic hip screw for pertrochanteric fracture [1]

Master thesis
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August 2012

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Preface

I am proud to present my master thesis, completing my master Health Sciences at the University of Twente.

Although it was sometimes a struggle and not everything went as I had expected my graduation at the Isala clinics/Netwerk Acute Zorg has been very pleasant. I would like to take the opportunity to thank some people who have helped me during my research. First of all, a big thank you to my supervisors Carine Doggen and Marten IJzerman for their supervision and support during this research period. I would also like to thank Karen Mentink, Sven van Helden and Dian Paasman. Thank you all for the constructive feedback I have received during the meetings and by e-mail.

In addition I would like to thank the hospital employees, especially the employees from ward B3, for the time and effort they have invested in order to be able to answer all my questions. I hope that my study will contribute to improving care for patients with a hip fracture.

Finally I would like to thank all my friends and family members who invested their free time in motivating and encouraging me during my graduation and who invested their free time in reviewing my master thesis!

Enschede, August 2012

Sarah Janus

[1] Retrieved March 09, 2012 from www.nursinghomesabuseblog.com/hip-fracture/

Abstract

Problem: Due to aging of the population, early detection of frailty in hospitalized elderly and taking preventive measures to functional decline becomes more important. The primary aim of the present study was to investigate whether the implementation of the Safety Management System "Kwetsbare Ouderen" in April 2012 at the Isala clinics in Zwolle, The Netherlands, led to an improvement of the care process in hip fracture patients aged 70 and older in comparison with the situation in 2011. The secondary aim was to explore the patient and physician satisfaction in April 2012.

Method: In a retrospective and prospective cohort, the effect of the Safety Management System was measured in patients with a hip fracture. Patients were included if they were aged 70 years and older, diagnosed with a hip fracture, admitted to the emergency ward where surgical intervention to restore the fractured hip was carried out. Exclusion criteria were a pathological hip fracture and bedridden status before admission. The outcomes before (February to May 2011 - group) and after (February to April 2012 – group) implementation were compared. The primary outcome measure was the length of hospitalization. Secondary outcome measures included the number of geriatric consultations, delirium, in-hospital deaths, consultations, surgery within 24 hours, postoperative complications and accommodation (post). All hospital related information is extracted from the patient files. Potential participants for the patient satisfaction questionnaire were eligible if they spoke Dutch and did not have dementia or a delirium. Physicians working at the surgical, orthopaedic or geriatric internal department were interviewed about their satisfaction. Satisfaction was measured in April 2012.

Results: The 2011-group consisted of 80 patients; the 2012-group consisted of 70 patients. Mean length of stay decreased with 1.1 days from 9.4 days in the 2011-group to 8.3 days in the 2012-group. Preoperative consultations of a geriatric occurred only once in the 2011-group (1%) compared to 14 out of 70 (20%) in 2012. Postoperative geriatric consultations did not change. Delirium did not change between the two groups. In the 2011-group 88% (N=70) had surgery within 24 hours and in the 2012-group only 76% (N=53) had surgery within 24 hours. In 2012 more minor complications were related to surgery (9% more), but less severe complications related to the general health of the patient (8% less). There were minor differences in the number of consultations of other specialists (geriatric consultations excluded). In 2011 16% less internal consultations were requested. There was also an increase in consultation requests for specialists who form the group "other" (14% more). Change in accommodation did not differ much between the two years. In 2011 the patients generated about € 200 more costs than the patients in 2012. Due to the significance of the length of stay in this research it was decided to identify predictors of the length of stay. The length of stay was related to gender, complications, repair type, surgery within 24 hours and previous accommodation.

The results from the patient satisfaction questionnaires showed that patients were highly satisfied with the care they received at the clinics. Patients evaluated quality of care provided by nurses, physicians and the overall quality of care as positive. Most physicians rate the quality of care only as reasonable and recommend more involvement of the internal department. The interviews with the physicians and the physician assistant reveal points of improvement for the treatment of hip fracture patients. All but one physician supported the idea of a co-managed treatment concept.

Discussion: The results of the study suggest that the implementation of the Safety Management System led to a minor improvement in the care process of elderly patients with a hip fracture. Since the implementation of the program, the length of stay slightly decreased and the percentage of preoperative geriatric consultations slightly increased. However, one should look at the impact of the program after some time has elapsed. A different approach, such as the co-managed treatment concept, might be necessary to increase the number in preoperative geriatric consultations. Providing extra care only for the frail and elderly might not be enough to reduce the length of stay with three days as expected.

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Abbreviations

ASA score A six category physical status classification system for assessing patients before surgery, established in 1963 by the American Society of Anesthesiologists (ASA) [1].

DOS lists The Delirium Observation Scale measures risks on mental disorders as a result of body changes [2].

LOS The length of stay (LOS) is defined as the total duration a patient is present in the hospital.

VMS The “Veiligheidsmanagementsysteem” (Safety Management System) [3] forms the system with which the hospitals can identify risks, carry out improvements, define their policy, evaluate and adapt. It embeds the patient safety in practice.

Introduction

In 2007, 17,900 patients with hip fractures were treated in hospitals in the Netherlands. In 2020 researchers expect 24,000 hip fracture surgeries [4]. The increasing number of fractures is related to the aging population. Hip fractures occur mainly in patients over 60 years [5]. Most hip fractures are associated with a fall. Approximately 30% of people aged 65 years and older fall at least once a year [6]. As one gets older, this percentage rises. The fall rate for patients aged 80 years and older is approximately 50% a year [6]. Elderly people are more at risk of falling due to intrinsic, extrinsic and environmental factors. Intrinsic factors are, among other things, less mobility, cognitive impairment, low blood pressure, insufficient muscle strength and impairment of vision [4, 7]. Extrinsic factors are for example certain medication intake and polypharmacy [4, 7]. Furthermore environmental factors such as poor lightning, loose carpets and unsafe bathroom surroundings contribute to the risk of falling [7].

A hip fracture can have fatal consequences as there are significant risks for the preservation of mobility and personal health. For the health care system as a whole, this accumulation of hip fractures is a major challenge. Almost all hip fractures require surgical intervention. This is designed to consolidate the fractured bone or replace it with a prosthesis for preservation of function [8, 9]. Such a treatment enables earlier mobilisation of the patients and avoids some of the complications of prolonged recumbency and immobilisation [10]. Approximately 25% of the elderly with a broken hip decease within one year and another 25% remain permanently disabled [11]. Nearly 50% of all patients never regain their pre-fracture activity level [12]. Furthermore a hip fracture can permanently change the old person's housing situation and mobility [13].

Elderly patients with a hip fracture who are admitted to hospital run the risk of certain complications such as infections, undernourishment, delirium and bedsores [14]. The 'Koninklijke Nederlandsche Maatschappij tot bevordering der Geneeskunst' [14] states that about 15 to 50% of the elderly placed in a hospital suffer such complications and can experience physical and mental decline. In order to prevent complications the KNMG has published a guideline to improve inpatient care [14]. It advises, for example, the use of a screening instrument for patients aged over 65 years. The screening should identify frail elderly patients. Those patients should then be treated by at least two medical specialists: a specialist in fracture treatment and a generalist with a geriatric background. This multidisciplinary evaluation of elderly patients with hip fracture at admission should then lead to the required geriatric medical management. A geriatrician is then responsible for medical care, and an orthopaedic surgeon for fracture management, operative decisions and discharge.

This multidisciplinary approach was first introduced in 1976 in Hastings, England [15]. The presence of geriatricians on orthopaedic surgery ward improved patients' outcomes such as activities of daily life, the number of medical complications, re-admissions and in-hospital deaths. By now several studies have been conducted in different countries that support better outcomes after hip surgery when the elderly are treated by a team of orthopaedic surgeons and geriatricians [8, 16-18]. These studies include a few randomized controlled trials as well as prospective and retrospective cohort studies. In addition, several meta-analyses summarize the outcomes of studies regarding the evaluation of a multidisciplinary approach for hip fracture patients [19, 20]. The studies demonstrate

that the implementation of a multidisciplinary treatment concept can have a positive effect on the length of stay, morbidity, complications, readmission rate and mortality [21] and the lowering of costs [19]. Due to the heterogeneity of the existing concepts of co-management and the variability in clinical practice, as seen for instance in the differences in length of hospital stay, the meta-analyses cannot give a clear answer with regards to the extent of the positive effect.

In the Netherlands there are two studies known which evaluate the implementation of the multidisciplinary treatment concept [22, 23]. In the hospital 'Ziekenhuisgroep Twente' located in Almelo, co-managed care by trauma-surgeons and geriatricians, using medical pathways, was started in 2009 in order to reduce the complication rate and the loss of functional outcome in elderly trauma patients with a hip fracture [22]. This approach is based on a study conducted in the USA [24]. In order to evaluate this approach, a historical comparative cohort study was carried out. There was no reduction in the duration of hospital stay. However, it appeared that the approach led to better short-term treatment outcomes for the elderly with hip fractures, such as, fewer complications after surgery, lower mortality and fewer re-admissions. Unfortunately the study lacks the assessment of long-term effects. In the Rijnstate hospital a multidisciplinary care project was implemented in 2009 [23]. In order to evaluate and monitor the effects of the implementations a prospective controlled before and after study was done. Both groups contained 40 patients. The implementation had a positive effect on the quality of life and the patient satisfaction with regards to the received information. Also the length of stay decreased.

The Isala clinics, located in Zwolle, the Netherlands, started planning the implementation of a co-management treatment concept by orthopaedics and geriatrics for elderly patients with a hip fracture. This approach, however, competed with another project. Whereas the surgical department was encouraging the implementation of a co-managed treatment concept to improve the care for the elderly, the clinics were busy improving the care of the elderly by implementing the Safety Management Program "Kwetsbare Ouderen" [25]. Eventually it was decided to prioritize the implementation of the "Kwetsbare Ouderen" program. This program should already improve the quality of care for patients with a hip fracture. The aim of this study is to identify and to measure the changes caused by the Safety Management System.

The "Veiligheidsmanagementsysteem" (VMS, Safety Management System) is intended for Dutch hospitals. About 93 hospitals participate in this program [3]. The subprogram "Kwetsbare Ouderen" is intended for all elderly patients aged 70 years and older. The final aim is to prevent a loss of function in patients aged 70 years and older during their hospital stay. Therefore the hospital has to first identify "kwetsbare ouderen" (frail elderly). In this context "frailty" means a collection of risk factors that can lead to a loss of physical functioning. The risk factors are associated with ageing, multi-co morbidity and physical constraints [26]. Due to the risk factors, frail elderly have an increased risk of complications such as delirium, malnourishment, pressure ulcers and infections [27]. These complications can lead to physical and mental decline. However it is possible to prevent these complications by an early identification of risks, starting with preventive actions and the provision of health care, adjusted to the elderly population [28]. The Safety Management System is restricted to the four main problems associated with functional decline: delirium, falling, undernourishment and physical constraints [3]. The hospital implements screening interventions to identify those risks and

implements (preventive-) treatment interventions to limit the four problems. The program provides screening for the risk of a delirium, which has to be carried out within the first 24 hours after admission [3]. After a positive identification the health care professional starts with preventive interventions such as for example prevention of dehydration, managing the nourishment situation and consulting a specialist in this area. The Deventer hospital (Netherlands) has already implemented the Safety Management System [29]. The hospital wanted to become a senior-friendly hospital, which means that they committed to actively pursuing the removal of unintentional harm in older patients. They drew up a plan of action, carried out pilot tests on the wards and then implemented the program. The health care professionals received training for the frail elderly program. After the implementation the number of consultation requests for the geriatric nurse increased. During the first quarter of the year 2011 about 9% of all patients aged 70 years and older and admitted at the Deventer hospital were screened by the VMS program. In September 2011 already 54% of this specific patient group was screened [29]. At the Vlietland hospital in Schiedam (Netherlands) the Safety Management System also led to an increase in the number of consultation requests for the geriatric nurse [30].

At the Isala clinics the emergency ward implemented the screening tool to detect frail elderly in April 2012. At the ward for hip fracture patients the screening tool for delirium was tested in October 2011 and implemented in April 2012.

This study compares the situation of elderly hip fracture patients hospitalized in 2011 with the situation in 2012. The primary outcome of this study is length of stay (LOS). Secondary outcomes are number of geriatric consultations, number of deliriums, in-hospital deaths and costs. It is expected that an increase in the number of geriatric consultations would take place. Furthermore it is hypothesized that the geriatric consultations would be correlated with the length of stay. More geriatric consultations are expected to prevent deliriums and therefore lead to a decrease of the LOS. Furthermore less in-patient days are expected to represent fewer complications and fewer costs. These changes are interpreted as an improvement of the care process for elderly patients with a hip fracture. Additionally, this study explores patient satisfaction and physician satisfaction after the implementation of the Safety Management System.

Problem

The findings from the literature led to the following research questions:

1. Did the implementation of the Safety Management System “Kwetsbare Ouderen” in 2012 at the Isala clinics, Zwolle (Sophia) lead to an improvement of the care process in hip fracture patients aged 70 and older in comparison with the situation in 2011?

In order to provide a basis for a specific research approach, a number of sub questions have been derived from the main research question.

a. Did the length of stay change in 2012 compared to the group in 2011?
b. Did the implementation of the Safety Management System lead to a change in the number of geriatric consultations?
c. Did the number of deliriums, in-hospital deaths, consultations, surgeries within 24 hours, postoperative complications and the average costs change in 2012 in reference to 2011?
d. Were there differences between the before (2011) and after (2012) group with regards to repair technique, fracture type, ASA classification or accommodation before surgery?
e. Did the change in accommodation (before and after hospital stay) shift in 2012 in comparison to 2011?
f. Did the number of geriatric consultations influence length of stay? If not, what influenced the length of stay?

2. How satisfied are the elderly hip fracture patients with the received care during hospital stay?
3. How satisfied are physicians with the current care for elderly hip fracture patients?

Methods

Study Design

In order to answer the main question regarding an improvement of the hip fracture care in 2012 a “before and after” study was designed. The Group 2011 (before group) consisted of patients who were hospitalized during February 1, to May 31, 2011. The data for this group was collected retrospectively. Group 2012 (after group) consisted of patients who were hospitalized during February 1 to April 30, 2012. Data was collected prospectively during the implementation of the VMS program.

In 2011, treatment was characterized by patient arrival at the Emergency Department, admission at the surgical department, surgery (or surgery before admission at the surgical department) and recovery. Consultations with several specialists in case of co-morbidity were requested by physicians at the emergency department or medical students in residency and physician assistants of the surgical department. There was no consultation of a geriatrician until a case of a possible delirium was identified. A multidisciplinary treatment with a proactive approach to reduce or prevent complications was missing. The treatment in 2012 was comparable to the treatment in 2011 with regards to the sequence health practices. However, due to the implementation of the Safety Management System, more attention was paid to the elderly. This resulted in screening for frail elderly using four questions at the emergency ward since April 4, 2012 [3]. Furthermore patients were screened for delirium by using “delirium observation screening” (DOS)-lists [31] on the ward.

In order to be able to answer the question with respect to the patient satisfaction a questionnaire (see Appendix B) was presented to elderly patients with a hip fracture throughout the month April 2012. The questionnaire was handed to the patient by the researcher. The patient could then decide to fill out the questionnaire himself or to delegate this task to the researcher.

The question relating to the physician satisfaction was answered by interviewing the physicians in question. The physicians belonged to the surgical, orthopaedic or internal departments. Therefore a semi-structured interview (see Appendix C) was developed and then the physicians’ were asked to anticipate in the interviews.

Study population

Potential participants were identified by reviewing patient files. Patients were eligible if they were 70 years and older, were diagnosed with a hip fracture, arrived at the emergency ward and surgery took place to restore the broken hip. Participants were excluded if they had a pathological hip fracture or were bedridden before admission. Potential participants for the patient satisfaction questionnaire were eligible if they spoke Dutch and did not have dementia or a delirium. For the physician satisfaction, physicians working at the surgical, orthopaedic or geriatric internal department were asked for a semi-structured interview.

Data collection and main outcome measurement

Baseline data [32] was collected including sex, age at surgery, living situation before admission, type of hip fracture, repair technique and physical status. The data was collected by the researcher. All hospital related information was taken from the patient files. The living situation before admission was determined and categorized in four categories. Those categories were home,

residential home, nursing home and other. The category “other” includes for example hospital and housing for persons with a handicap. The “accommodation after hospital stay” was categorized in the same categories as “accommodation before admission”. The category “other” includes hospice, rehabilitation and hospital. The type of hip fracture was noted and divided into four categories: femoral neck fracture, pertrochanteric femur fracture, subtrochanteric femur fracture and “other”. The repair technique was categorized according to the type of fixation used during surgery and included hemi-arthroplasty, gamma-nail, dynamic hip screw, femur pen and “other”.

Finally the physical status was measured by means of collecting the ASA scores [1]. The ASA scores are determined by the anesthetist prior to surgery. They are attached to the patient files. The ASA scores categorize the patients’ physical status into six categories. One, describes a healthy person, two, a patient with mild systemic disease, three, a patient with severe systemic disease and four, a patient with severe systemic disease that is a constant threat to life. The scores five and six describe patients who are not expected to survive the surgery or are already brain-dead.

Outcome measures

The primary and secondary outcome measures were collected by the researcher and retrieved from the patient files, except for costs. The direct costs were identified using the financial information system of the Isala clinics.

The primary outcome measure was the LOS. It was defined as the number of days in which the patient was in hospital. It was calculated using admission time and date and discharge time and date from the patient file.

Secondary outcome measures were determined and collected, including number of geriatric consultations, delirium, in-hospital deaths, consultations by specialists, surgery within 24 hours, postoperative complications and accommodation (post). The number of geriatric consultations during hospital stay was identified using patient files. Those include a consultation request done by the ward physician. The geriatric consultations were categorized in preoperative and postoperative consultations. The consultation by a geriatric internist was only counted once; even though the specialist might have seen the patient several times.

If mentioned in the patient file as a diagnosis, a delirium was considered present. In-hospital deaths were measured in order to have a clearly measurable quality-related patient outcome. It is defined as death prior to discharge. The in-hospital deaths were determined with the aid of the patient files. Also the number of consultations per patient other than geriatric consultations was assessed. Those consultations included consultations by an internist, a pulmonary specialist or cardiologist. The consultation by a specialist was only counted once; even though the specialist might have seen the patient several times. The consultations by other specialties were collected in the same way as the geriatric consultations. They were identified using patient files, which include a consultation request. Surgery within 24 hours was achieved when the time the patient arrived in the operating room minus the recorded admission time was less than 24 hours. Studies have shown that waiting time for surgery should not exceed 24 to 36 hours, as further delay may lead to longer hospitalization and postoperative complications [33, 34].

Postoperative complications were collected by reviewing the patient file. The complications were categorized into complications as a result of surgery and complications regarding general physical functioning. Furthermore the complications were defined as light or severe complications. The categorization was done by a trauma surgeon (see Appendix A). The change in accommodation was determined by “accommodation after hospital stay” and “accommodation before admission”. Seven groups were formed. Those groups were: 1 = came from home returned to home, 2 = came from home returned to accommodation for the elderly, 3 = came from residential home returned to residential home, 4 = came from residential home returned to nursing home, 5 = came from nursing home returned to nursing home, 6 = came from nursing home returned to residential home, 7 = other (rehabilitation, hospice, etc.).

As another secondary outcome, direct costs were determined. The direct costs refer to costs of the health care services which relate to the treatment of the hip fracture during hospital stay. The direct costs were identified using the financial information system. This system contains costs for the medical imaging services, inpatient stay, medications and nursing services. The costs for the physicians are not taken into account.

Patient and physician satisfaction were measured in April 2012. The patient satisfaction questionnaire was presented to hospitalized patients. The questionnaire was developed according to recent literature and discussed within a team of researchers, physicians and nurses. The development of the questionnaire and the actual questionnaire can be found in Appendix B. The patient satisfaction was measured with regard to three aspects of in-hospital care. Those aspects were: quality of care provided by the nurses, quality of care provided by the physicians and overall satisfaction with received health care.

So far the physician satisfaction as a concept has not yet been used in other studies. The physician satisfaction is measured by conducting semi-structured interviews. The questions used can be found in Appendix C.

Statistical analysis

Descriptive analysis were used to describe the before and after groups. Continuous variables were expressed as means with standard deviations and categorical variables were expressed as number of cases and percentages.

The differences in clinical characteristics between the two groups were tested by chi-square tests for proportions of categorical variables. Unpaired t-tests were used for normal distributed continuous variables and the Mann-Whitney-U test for non-parametric variables. Normality of variables was evaluated using Kolmogorov-Smirnov statistics. Statistical significance was established as $p < 0.05$, with all tests being two-tailed. Multiple linear regression analysis was used to identify factors which predicted a prolonged hospital stay.

The statistical analysis was accomplished using the SPSS version 18 (SPSS Inc., Chicago, US).

Sample size

It was assumed that the Safety Management System introduced in 2012 would have some impact on the LOS. The Mean LOS in 2011 was 9 days with a standard deviation of 5.8. To determine the sample size, a power analysis with a two-tailed test of significance with an alpha of 0.05, a beta of 0.20 to detect a difference of three days (D. Paasman, project manager 'Ouderenzorg' Isala clinics, personal interview, March 20, 2012) in LOS (standard deviation = 6) and the assumption of the same sample sizes in the two groups was used. The power analysis determined that 61 participants were required in each group.

Furthermore it was assumed that the Safety Management System introduced in 2012 would have some impact on the proportions of preoperative geriatric consultations. In 2011 only 1% of the patients received a geriatric consult before surgery. According to a power analysis using a two-tailed test of significance with an alpha of 0.05, a beta of 0.20 to detect a difference of 10% in the proportions of preoperative geriatric consultations and the assumption of the same sample sizes in the two groups, a sample size of 88 participants was required in each group.

Results

During the months February to May 2011 80 patients (before the implementation of Safety Management System) fulfilled the in- and exclusion criteria. In 2012, data was collected during the months February to April and the after group consisted of 70 patients (see Table 1). The patient characteristics did not differ between the two groups except for the 'accommodation after hospital stay'. Less patients return to their homes, however this was due to less patients living at home before hospital admission. Those differences were further analyzed (see Table 2).

Table 1 Results of the demographic characteristics of the two groups

	Group 2011	**Group 2012**	**p-value**
Number patients	80	70	
Gender			
○ men (%)	21 (26)	25 (36)	
○ women (%)	59 (74)	45 (64)	0.21
Age (mean, SD)	82.3 (6.2)	82.4 (7.0)	0.93
Accommodation before admission (%)			
○ home	62 (78)	45 (64)	
○ residential home	8 (10)	14 (20)	
○ nursing home	8 (10)	8 (11)	
○ other	2 (2)	3 (5)	0.27
Accommodation after hospital stay (%)			
○ home	33 (41)	18 (26)	
○ residential home	10 (13)	20 (29)	
○ nursing home	31 (39)	23 (33)	
○ other	6 (7)	9 (13)	0.02
Fracture type (%)			
○ femoral neck fracture	39 (49)	33 (47)	
○ pertrochanter femur fracture	30 (38)	28 (40)	
○ subtrochanter femur fracture	5 (6)	3 (4)	
○ other	6 (8)	6 (9)	0.94
Repair techniques (%)			
○ hemi-arthroplasty	31 (39)	35 (50)	
○ gamma-nail	36 (45)	26 (37)	
○ dynamic hip screw	11 (14)	8 (11)	
○ femur pen	2 (3)	-	
○ other	-	1 (1)	0.32
ASA classification (%)*			
I	6 (10)	2 (4)	
II	18 (30)	19 (38)	

III	34 (57)	27 (54)	
IV	2 (3)	2 (4)	
V	0	0	
VI	0	0	0.59

*ASA classification= classification of co morbidity and preoperative diseases according to the American Society of Anaesthesiologists; I = healthy patient; VI= brain-dead patient; missing: before group N=20, 25%; after group N=20, 29%

The primary outcome, the mean length of stay, decreased with 1.1 days (CI -0.79 – 2.99) from 9.4 days in the 2011-group to 8.3 days in the 2012-group (see table 2).

One of the secondary outcomes was the number of geriatric consultations. The results in the number of pre- and postoperative consultations were different between 2011 and 2012 (see Table 2). Preoperative consultations of a geriatric occurred only once in the 2011-group (1%) compared to 14 out of 70 (20%) in 2012. In 2012 the geriatric internist came in to consult more often than in 2011 ($p< 0.001$). Postoperative geriatric consultations did not change. However the percentages suggest an increase in geriatric consultations. In 2012 the geriatric internist was consulted 8% more often.

Delirium did not change between the two groups. In 2011 three out of 80 (4%) patients died within their hospital stay. In 2012 four patients (7%) out of 71 patients died in the hospital. These differences show only little variation.

Table 2 Results of the outcome measures of the two groups

	Group 2011 N=80	**Group 2012 N=70**	**p-value**
Primary outcome measure			
Length of stay (mean, SD)	9.4 (5.8)	8.3 (6.0)	0.25
Secondary outcome measure			
Consultations Geriatric (%)			
Pre	1 (1)	14 (20)	<0.001
Post	12 (15)	16 (23)	0.22
Complications (%)			
Delirium	10 (13)	9 (13)	0.95
In-hospital deaths (%)	3 (4)	5 (7)	0.36
Time to surgery within 24 hours	70 (88)	53 (76)	0.06
Complications (%)			
Related to surgery			0.15
o Light	6 (8)	12 (17)	
o Severe	3 (4)	4 (6)	
o None	71 (89)	54 (77)	
General			0.40
o Light	26 (33)	22 (31)	
o Severe	15 (19)	8 (11)	
o None	39 (49)	40 (57)	
Consultations			
o internist	41 (51)	27 (39)	0.12
o pulmonary physician	10 (13)	11 (16)	0.57
o cardiologist	28 (35)	23 (33)	0.78

○ other	8 (10)	12 (24)	0.19
Change in accommodation (%)*			
○ home	32 (38)	17 (24)	
○ home-residential/nursing home	26 (33)	22 (31)	
○ residential home	3 (4)	8 (11)	
○ residential-nursing home	3 (4)	5 (7)	
○ nursing home	4 (5)	4 (6)	
○ nursing-residential home	3 (4)	3 (4)	
○ other	9 (11)	11 (16)	0.29
Costs in € (mean, SD)	8977 (6270)	8780 (8322)	0.87

*missing: before group N=1

Time to surgery differs between the two groups. In the 2011-group 88% (N=70) had surgery within 24 hours and in the 2012-group only 76% (N=53) had surgery within 24 hours. In 2012 more minor complications were related to surgery (9% more), but less severe complications related to the general health of the patient (8% less).

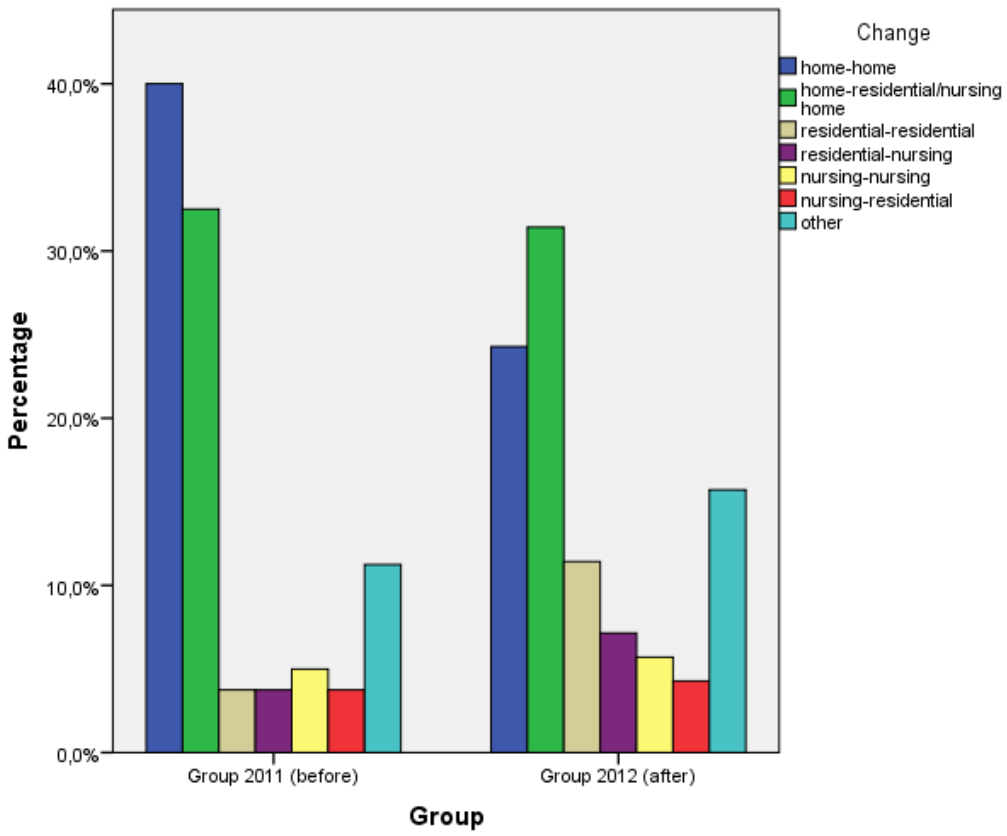

Figure 2 Change in accommodation before and after hospital stay

There were minor differences in the number of consultations of other specialists (geriatric consultations excluded). In 2011 16% less internal consultations were requested. There was also an increase in consultations requests for specialists who form the group “other” (14% more). In 2011 and in 2012 mainly specialists of the internal, pulmonary medicine and the cardiology department were consulted. Other specialists were neurologists, urologists, rehabilitation physicians and psychiatrists.

In 2012 fewer patients returned home after their hospital stay (38% versus 24% in 2012, see Figure 2). The percentage of people living at home before admission and returning to a residential or nursing home stayed about the same (33% versus 31% in 2012). The other changes in accommodation did not differ much between the two years. Finally, costs were compared. In 2011 the patients generated a slightly more costs than the patients in 2012. In 2011 the average hospital stay cost about € 9,000 and in 2012 it cost about € 8,800. Due to only minor changes within the costs per patient, costs were not further analyzed.

Besides analyzing the data only with regard to the before and after group, the data was also analyzed with regard to the differences between patients getting a preoperative geriatric consultation in 2012 and the remaining patients from the after group (2012-group, see Appendix D). The group receiving a preoperative consultation did not differ much from the remaining patients. They were not significantly more ill regarding the ASA scores. However the group contained more patients coming from a residential home. After hospital stay more patients with a preoperative geriatric consultation returned to a nursing home. Furthermore they stayed about one day longer in hospital. Also fewer patients with a preoperative geriatric consultation had surgery within 24 hours. Only 57% of the patients had surgery within 24 hours. In the group without a preoperative geriatric consult 81% had surgery within 24 hours. The group with preoperative consultations had more general light complications (43 versus 28%). Finally the group with preoperative consultations generated about 2,500 € more costs than the group without the consultations.

Predictors of length of stay

Table 3 Multiple linear regression predicting Length of Stay

Predictor	Unstandardised regression coefficients	CI for coefficients	P value
Constant	18.04	11.03 – 25.06	0.00
Gender	2.3	.43 – 4.19	0.02
Complications - area of surgery	-1.35	-2.44 - .19	0.09
Complications - general	-1.21	-2.33 - -.37	0.01
Repair type	-1.21	-2.44 – 0.18	0.06
Fracture type	1.47	.38 – 2.56	0.05
Surgery within 24 hours	-2.56	-4.89 - -.22	0.03
Accommodation before	-1.33	-2.43 - -.22	0.02

Due to the significance of the length of stay in this research it was decided to analyze it further. Therefore a multiple linear regression analysis was performed to identify the predictors of the length of stay. Variables entered were age, gender, presence of delirium, pre-/ postoperative geriatric consultations, surgery within 24 hours, accommodation before surgery, fracture type, repair type and number of complications (general/ area of surgery). The optimum predictive model included the following variables: gender, complications, repair type, fracture type, surgery within 24 hours and accommodation before. For this model, r= 0.49, R^2=0.22, P>0.001. The statistical significance of each

predictor is shown in Table 3. The model shows that gender and fracture type are associated with a longer length of stay. The other variables are associated with a shorter length of stay.

Patient satisfaction

During the month April 2012, 24 patients stayed at the hospital with a hip fracture trauma (see Appendix E). Only 12 patients were included in the study population for the patient satisfaction. All of them agreed to participate. The remaining patients had dementia or a delirium. Out of the 12 patients eight were women and four were men. All patients decided to fill out the questionnaire together with the researcher. This meant that the researchers asked the questions and filled out the patient's answer. It is noteworthy that the patients were highly satisfied with the care they received at the hospital. None of the patients indicated dissatisfaction in any areas queried. They were all satisfied with the care received from the nurses and with the physicians. However, the patient group asked, differs with regard to age and health status from the remaining patients. The selected patients were on average six years younger than the average patient of the total study population ($P< 0.05$). They were also healthier and had therefore lower ASA scores ($P< 0.05$). Furthermore they need less attention from other specialists ($P< 0.1$).

Physician satisfaction

During 2012, three trauma surgeons, four trauma orthopaedists and one geriatric internist were involved in treatment of patients with a hip fracture at the Isala clinics. All but one were invited to participate in the study. One of the trauma surgeons was involved in the present study and was therefore not asked. Eventually two trauma surgeons, one trauma orthopaedist and the geriatric internist were interviewed. Due to the low participation rate, a physician assistant was asked to participate. Thus, five persons were interviewed.

The physicians and physician-assistant rated the quality of care for the patient population with hip fractures as reasonable. One rated the quality as bad (see Appendix C). Positive aspects of the current treatment differed between the five participants. Positive aspects named were presence of every discipline in the hospital, fast mobilization of patients with a hip fracture by a physiotherapist and surgery usually taking place within 24 hours. A problematic aspect of the treatment was mentioned somewhat more consistently. Three mentioned that the patients did not receive enough care from an internal physician. An example mentioned was that the medical students in residence at the surgical department do not possess enough knowledge to adequately treat patients with co-morbidities. Another example was that the geriatric internist or his assistants were not consulted at the starting point of the treatment. Other problems mentioned were the long waiting time for a place in a revalidation centre and the long waiting time for surgery. Patients were likely to be rescheduled for later surgery, because their injuries were not evaluated as extremely urgent.

The physicians and the physician assistant also differed in their solutions to improve the care for patients with a hip fracture. Three of the physicians wanted more consultations by a geriatric internist (or a physician with a comparable background) for the patients with a hip fracture. A constant contact person within the internal department of the surgical and orthopaedic department is expected to increase the amount of internal care received by the patient with a hip fracture by some of the

physicians. One physician wanted more experienced staff and another one wanted a separate surgery room for fractures. Four out of five physicians asked, supported the idea of a co-managed treatment concept.

Discussion

The primary aim of the present study was to investigate whether the implementation of the Safety Management System “Kwetsbare Ouderen” in 2012 at the Isala clinics led to an improvement of the care process in hip fracture patients aged 70 years and older in comparison with the situation in 2011. The results of the study suggest that the implementation of the Safety Management System led to a minor improvement within the care and clinical outcomes of elderly patients with a hip fracture. Since the implementation of the program, the length of stay decreased by one day and the percentage of preoperative geriatric consultations increased by 19%. However there were no differences in the percentage of deliriums or the in-hospital deaths. This is also true for the number of consultations with regard to cardiologists, pulmonary physicians and internists and the number of postoperative complications. The number of surgeries within 24 hours and the costs did slightly change. In 2012 fewer surgeries took place within the first 24 hours. The direct costs decreased by € 200. Less people returned to their homes in 2012. The other changes in accommodation did not differ much between the two years. The additional analysis revealed that the length of stay was influenced by gender, number of complications, accommodation before surgery and operation type. The analysis regarding differences between patients who get a preoperative geriatric consult in 2012 and the remaining patients from the after-group did not identify any significant differences. Patients with a preoperative geriatric consultation stayed longer in hospital, and were less likely to have surgery within 24 hours as well as generating more costs.

Furthermore, the study tried to give an overview of the current patient satisfaction. The results from the patient satisfaction questionnaires show that patients are highly satisfied with the care they receive at the hospital. None of the patients indicated dissatisfaction in any area queried. The patients evaluated the quality of care provided by the nurses, physicians and the overall quality of care as positive. The physician satisfaction was measured in order to provide answer to how satisfied the physicians are with the current care for hip fracture patients. Most physicians rate the quality of care only as reasonable and suggest a better involvement of the internal department. The interviews with the physicians and the physician assistant reveal points of improvement for the treatment of hip fracture patients. All but one physician support the idea of a co-managed treatment concept.

A first start has been made to improve the quality of care of patients with a hip fracture. The Safety Management System has led to more preoperative geriatric care. This is comparable to what was known from the literature. The Vlietland hospital, which had already implemented the whole Safety Management System [29], also found an increase in requests for geriatric consultations. However at the Isala clinics, there is a different situation: an increase in geriatric consultations and a decrease in internistic consultations (in 2012 12% less). Therefore one can assume that the total amount of received care did not change, but a shift in requested consultations from internistic to geriatric consultations took place. Moreover, the preoperative geriatric consultations occurred in only 20% of the patients in the second group. More consultations might be needed in order to decrease complications and consultations of other specialties. It is questionable whether the Safety

Management System leads to sufficient geriatric consultations. Apparently the Safety Management System identifies quite a small amount of the hip fracture patients as “frail patients”. Therefore a different approach, as for example, the co-managed treatment concept, should be taken. The Ziekenhuisgroep Twente in Almelo, The Netherlands, achieved a significantly higher increase in geriatric consultations by implementing a multidisciplinary treatment concept for elderly hip fracture patients. They increased the pre surgical geriatric consultations from 4 to 91% for their patients. However, the current study was carried out during the implementation of the Safety Management System. The program was carried out mainly during the last month of the study in April 2012. This is expected to bias the results and lead to less positive overall result.

Additionally, it was expected that the geriatric consultations would influence the LOS. Indeed the LOS decreased by one day. However, the preoperative consultations were not found to influence the LOS directly. Gender, number of complications, accommodation before surgery, fracture type and surgery within 24 hours had significant partial effects on the length of stay. Nevertheless, the model predicting the length of stay, explains only 22%. Therefore other variables which were not measured in the current study might be of significance. Such a variable could be waiting time for place in a nursing home. Further research is needed to explain the LOS.

The discharge destination was measured in order to prevent a shift of the costs. There would be cost-shifting if reductions in costs in the hospital were offset by increases in costs after hospital discharge. This was found for example in a study by Weingarten et al. [35]. This would mean that in the new situation more people need to go to a nursing home after their hospital stay. However the overall change in accommodation did not differ significantly between the two groups and might therefore be due to chance.

The costs were analyzed. Only a small difference between the two groups was found. This could be due to the composition of the costs. The costs did not contain the costs for the physicians. However more consultations by a geriatric before surgery with no/only slight changes in the LOS should lead to more costs. Therefore this cost analysis might not be specific enough. A cost analysis with all direct costs would be more useful.

The results of the patient satisfaction questionnaires and interviews with the physicians offer further insights into the evaluation of the VMS program. The patient satisfaction was measured during April 2012. Only twelve patients were asked to fill out the questionnaire. The remaining patients had to be excluded. The results show that the patients were satisfied with the received care. Knowing that the patients had to share one room with seven other patients, it is hard to believe that all patients were satisfied with all aspects of the received care. There is not much variation within the patients’ answers. However the patients are dependent on the given care due to their injury. They lack the medical knowledge and therefore cannot judge unbiasedly the received care. The literature suggests that different factors contribute to the high satisfaction scores in the elderly patient population [36, 37]. Elderly patients were found to possess less medical knowledge, were more inclined to give socially desirable response, had a more external located locus of control and were more fearful of complaining [36]. To avoid biases, it might be useful to measure the patient satisfaction after the hospital stay. Then the patients are expected to be less dependent on the care provided by the hospital. It might

also be useful to collect the responses via mail to decrease the pressure for possible socially desirable responses. Besides, mailing the questionnaires to the patients would make it possible to collect data from a larger population. However mailing the questionnaires has limitations as well. Patients with dementia might not remember their hospital stay adequately and the memories of the hospital stay might change due to health status of the patients. Furthermore, it is questionable if a questionnaire is the right way to evaluate the patient satisfaction. A large group of patients had to be excluded, because they were not able to fill out the questionnaire. The remaining patients form a distinct group. They were younger and healthier than the rest of the patients. Therefore their results might differ from the older and sicker patients. The patient satisfaction is however subjective by nature. Older patients, however, often have dementia which leads to several difficulties. They have cognitive deficits with regard to their memory, language and judgment which hinder access to the subjective world of the patient [38]. Also patients with dementia have non-cognitive symptoms like agitation, depression and delusion which can interfere with the evaluation of the satisfaction [38]. Therefore it might be necessary to ask not the patients themselves but family members. Also one should collect patient data over several months in order to gather an adequate amount of data.

In contrast to earlier studies [22, 23] this study also measured the physician satisfaction. The interviews were evaluated as a useful addition. They give a clear picture about the physician satisfaction with the current treatment and identify ways to improve the care process. However, it was quite difficult to arrange interviews with the orthopedic surgeons. Only one orthopedic surgeon was willing to be interviewed. A reason for the small participation is possibly the shortage of time the surgeons have. Another possibility is that not every surgeon judges the evaluation of the current treatment concept as equally important. The low participation rate might distort the results however. The health care delivered for patients with a hip fracture is evaluated only as reasonable or even as bad by all physicians. The physicians make different suggestions for improvements. Most of them are related to a better involvement of the geriatric internist. Most suggestions are easier to implement than a co-managed treatment concept. The co-managed treatment concept would also have financial implications and requires a new treatment protocol. During the interviews it was suggested to install a constant contact person within the internal medicine department. This could facilitate the contact within the two departments. Furthermore there was the suggestion that every patient should be seen by an internist. Therefore the physicians simply need to be consulted, which means, in practice, filling out one additional form. However, the contact between the surgical and internal department only proceeds between the medical students in residency and physician assistants of both departments. Therefore the medical students in residency and physician assistants are responsible for changing the treatment and asking the geriatric internist more often. In the process of implementing improvements to the hip fracture care one should therefore not only engage surgeons and geriatric internist but also medical students in residency and physician assistants. They eventually carry out the care at the departments.

Before concluding the conducted research needs to be evaluated. Firstly, as a positive point, it should be mentioned that the research contributes to providing information about a subject that is of great importance due to the large number of elderly patients admitted at the hospital. Elderly patients

are often fragile and are at risk of several complications during their hospital stay. Those complications worsen the quality of life for the elderly patient and cause high costs for society. Furthermore this research is of value for the Isala clinics. The whole study process revealed that changes within the hospital require much lead time and require good organization. In addition, this study demonstrates that the implementation of changes can run into resistance. Besides the process, the study itself has a wide scope and consists of many different aspects. Data is gathered using electronic patient dossiers, using questionnaires and make use of interviews.

However, this study has also some limitations. For example, this study has a before and after design, which can lead to difficulties in differentiation between the effect of the intervention and that of other influences [39]. The reduction of the LOS, for example, might be due to the role of secular change, for example general trends occurring independent of clinical interventions [39]. The LOS have generally decreased [40], therefore this secular trend might be a potential bias. Due to time and organizational constraints, it was not possible to do a randomized controlled trial. Therefore the purpose of this study was to gather information over changes and to give an overview of the current situation. Furthermore, the data was collected retrospectively. This can have several limitations as for example incomplete or missing data within the patient files, records lacking specific patient information and variability in the quality of documentation among health care personnel [41]. In this study 25-29% of the ASA scores were missing because the scores were not filled out in the specific form. Fortunately, this was the only variable which contained missing variables. The reason for collecting data retrospectively was that this data offers an existing group of exposed subjects and therefore there is no waiting time for the data collection. Furthermore the use of medical record data is highly practical in the study of quality assurance and improvement in clinical practice [42].

An additional limitation of this study is the restriction to short-term outcomes. In a following study one should also consider long-term outcomes. Outcomes of interest could be deaths within one or two years and living situation after one year. Studying long-term outcomes would be of value because those aspects are not yet studied extensively in the literature [43].

Another limitation is the particular time during which this study took place. It started a little bit too early. The main implementation of the safety management intervention took place in April 2012. Even though the health care professionals were already more alert and knew more about the frailty of the elderly during the study period in 2012, it might be more useful to collect data from months after the implementation (April 2012). The relatively low number of preoperative geriatric consultations in the 2012-group might be therefore due to the unfinished implementation.

The patient and physician satisfaction were only measured in 2012. There has been no measurement in 2011. Therefore no changes were measured. The results only provide an overview of the current situation. A second measurement would be useful to identify changes within the satisfaction levels. Patients might be even more satisfied because they receive even more care. Physicians might be more satisfied because the provided care improved or they might be less satisfied because the workload intensified.

Overall, the Safety Management System led to a small improvement within the care of elderly patients with a hip fracture. An increase in preoperative geriatric consultations has taken place.

However it did not provide strong evidence for an overall success of the Safety Management System. The LOS decreased only with one day and there were no changes in the number of complications. Future studies within the Isala clinics are recommended. One should look at the impact of the program after some time has elapsed. Then health care professionals are familiar with the new protocol and have internalized the procedures. A different approach, such as the co-managed treatment concept, might be necessary to increase the number in preoperative geriatric consultations [16, 22]. Including only frail elderly might not be enough to reduce the length of stay enough to achieve a decrease of three days as expected (see Sample size calculation). Therefore a more consistent approach might be necessary.

References

1. Wolters, U., Wolf, T., Stützer, H. & Schröder, T., *ASA classification and perioperative variables as predictors of postoperative outcome.* British Journal of Anaesthesia, 1996. **77**: p. 217-222.
2. Schuurmans, M., Deschamps, P., Markham, S., Shortridge-Baggett, L.& Duursma, S., *The Measurement of Delirium: Review of Scales.* Research and Theory for Nursing Practice: An International Journal, 2003. **17**: p. 207-224.
3. VMS. *Factsheets indicatoren Kwetsbare Ouderen*. 2010 06-04-2012 [cited 2012 06-04]; Available from: http://www.vmszorg.nl/Documents/Tools_Extras/Thema's/KO/20091400%20Factsheets%20indicatoren%20kwetsbare%20ouderen.pdf.
4. Saltzherr, T., Borghans, H., Bakker R. & Go, P., *Proximale femurfracturen bij ouderen in Nederland in de periode 1991-2004: incidentie, sterfte, opnameduur en schatting van de in de toekomst benodigde zorgcapaciteit.* Nederlandse Tijdschrift voor Geneeskunde, 2006. **150**: p. 2599-2604.
5. van Balen, R., Steyerberg, E., Polder, J., Ribbers, T., Habbema, J. & Cools, H., *Hip Fracture in Elderly Patients: Outcomes for Function, Quality of Life, and Type of Residence.* Clinical Orthopaedics & Related Research, 2001. **390**: p. 232-243.
6. Stalenhoef, P., Crebolder, H., Knottnerus, J. & Van der Horst, F., *Incidence, risk factors and consequences of falls among elderly subjects living in the community.* European Journal of Public Health, 1997. **7**: p. 328-334.
7. Lönnroos, E., *Hip fractures and medication-related falls in older people,* in *Faculty of Medicine*. 2009, University of Kuopio: Kuopio. p. 96.
8. Friedman, S., Mendelson, D., Kates, S. & McCann, R., *Geriatric co-management of proximal femur fractures: total quality management and protocol-driven care result in better outcomes for a frail patient population.* Journal of the American Geriatrics Society, 2008. **56**: p. 1349–1356.
9. van Helden, S., *Looking beyond the fracture - Prevention in fracture care.* 2008, Gildeprint: Enschede.
10. Handoll, H., Sherrington, C. & Parker, M., *Mobilisation strategies after hip fracture surgery in adults.* Cochrane Database of Systematic Reviews, 2007. **1**: p. 1-94.
11. Lanting, L., Stam, C., Hertog, P. & Brugmans, M. *Hoe vaak komen heupfracturen voor en hoeveel mensen sterven eraan?* Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid. 2010 [cited 2012 02-16]; Available from: http://www.nationaalkompas.nl> Nationaal Kompas Volksgezondheid\Gezondheid en ziekte\Ziekten en aandoeningen\Bewegingsstelsel en bindweefsel\Heupfractuur.
12. Talkowski, J., Lenze, E., Munin, M., Harrison, C. & Brach, J., *Patient participation and physical activity during rehabilitation and future functional outcomes in patients after hip fracture.* Archives of Physical Medicine and Rehabilitation, 2009. **90**: p. 618-622.
13. Stenvall, M., Elinge, E., von Heideken Wagert, P., Lundstrom, M., Gustafson, Y. & Nyberg, L., *Having had a hip fracture-- association with dependency among the oldest old.* Age & Ageing, 2005. **34**: p. 294-297.
14. KNMG. *Sterke medische zorg voor kwetsbare ouderen*. 2010 [cited 2012 02-16]; Available from: www.knmg.nl.
15. Devas, M., *Geriatric orthopaedics.* Annals of the Royal College of Surgeons of England, 1976. **58**: p. 16-21.
16. Vidan, M., Serra, J., Moreno, C., Riquelme, G. & Ortiz, J., *Efficacy of a comprehensive geriatric intervention in older patients hospitalized for hip fracture: a*

randomized, controlled trial. Journal of the American Geriatrics Society, 2005. **53**: p. 1476-1482.
17. Santamaria, N., Houghton, L., Kimmel, L. & Graham, A., *Clinical pathway for fractured neck of femur: a cohort study of health related quality of life, patient satisfaction and clinical outcome.* Australian Journal of Advanced Nursing, 2003. **20**(24-29).
18. Gregersen, M., Metz Mørch, M., Hougaard, K. & Damsgaard, E., *Geriatric intervention in elderly patients with hip fracture in an orthopedic ward.* Journal of Injury and Violence Research, 2011: p. doi: 10.5249/jivr.v4i2.96.
19. Cameron, I., Handoll, H., Finnegan, T., Madhok, R. & Langhorne, P., *Co-ordinated multidisciplinary approaches for inpatient rehabilitation of older patients with proximal femoral fractures (Cochrane Review).* Cochrane Database of Systematic reviews, 2009(4).
20. Kammerlander, C., Roth, T., Friedman, S., Suhm, N., Luger, T., Kammerlander-Knauer, U., Krappinger, D. & Blauth, M., *Ortho-geriatric service—a literature review comparing different models.* Osteoporosis International, 2010. **21**: p. 637–646.
21. Pederson, S., Borgbjerg, F., Schousboe, B. et al., *A Comprehensive Hip Fracture Program Reduces Complication Rates and Mortality* Journal of the American Geriatrics Society, 2008. **56**: p. 1831-1838.
22. Folbert, E., Smit, R., van der Velde, D., Regtuijt, M., Klaren H. & Hegeman J., *Multidisciplinair zorgpad voor oudere patiënten met een heupfractuur: resultaten van implementatie in het Centrum voor Geriatrische Traumatologie, Almelo.* Nederlandse Tijdschrift voor Geneeskunde, 2011. **155**: p. A3197.
23. Blonk Centen, H., Wijnen, H., Jansen, M. & van Loon, C., *De effecten van het implementeren van een zorgpad voor patiënten met een heupfractuur.* Nederlands Tijdschrift voor Traumatologie, 2011. **3**: p. 64-71.
24. Friedman, S., Mendelson, D., Bingham, K. & Kates, S., *Impact of a Comanaged Geriatric Fracture Center on Short-term Hip Fracture Outcomes.* Archives of Internal Medicine, 2009. **169**: p. 1712-1717.
25. VMS. *Kwetsbare Ouderen*. 2009 [cited 2012 06-04]; Available from: http://www.vmszorg.nl/10-themas/Kwetsbare-ouderen.
26. Walston, J., Hadley, E., Ferrucci, L. et al., *Research agenda for frailty in older adults: toward a better understanding of physiology and etiology: summary from the American Geriatrics Society/ National Institute on Aging Research Conference on Frailty in Older Adults.* . Journal of the American Geriatrics Society, 2006. **54**: p. 991-1001.
27. Boyd, C., Landerfeld, C., Counsell, S. et al., *Recovery of activities of daily living in older adults after hospitalization for acute medical illness.* Journal of the American Geriatrics Society, 2008. **56**: p. 2171-2179.
28. Bradley, E., Webster, T., Schlesinger, M., Baker, D. & Inouye, S., *Patterns of diffusion of evidence-based clinical programmes: a case study of the Hospital Elder Life Program.* Quality and Safety in Health Care, 2006. **15**: p. 334-338.
29. VMS-Veiligheidsprogramma. *Deventer Ziekenhuis: Zorgprogramma Kwetsbare Ouderen*. 2011 [cited 2012 02-08]; Available from: http://www.vmszorg.nl/Kenniscentrum/Week-van-de-Patientveiligheid/Nationale-Patientveiligheid-Award/Nationale-Patientveiligheid-Award-2011/Overige-inzendingen/Deventer-Ziekenhuis-Kwetsbare-Ouderen-vroegtijdige-herkenning-van-complicaties.
30. VMS. *Vlietland Ziekenhuis: Zorgprogramma Kwetsbare Ouderen*. 2011 [cited 2012 02-08]; Available from: http://www.vmszorg.nl/Kenniscentrum/Week-van-de-

Patientveiligheid/Terugblik-eerdere-jaren/Award-2010/Overige-inzendingen/Vlietland-Ziekenhuis-Zorgprogramma-Kwetsbare-Ouderen.
31. Persoon, A., Joosten, L., van de Vrije, W., Olde Rikkert, M. & van Achterberg, T., *Nederlandstalige observatieschalen voor onderzoek van cognitief functioneren van ouderen.* Tijdschrift Gerontologie en Geriatrie, 2006. **37**: p. 242-252.
32. Burgess, D., Gebski, V. & Keech, A., *Baseline data in clinical trials.* The Medical Journal of Australia, 2003. **179**: p. 105-107.
33. Lubberding, S., Merten, H. & Wagner, C. *Patiëntveiligheid en Complexe Zorg bij oudere patiënten met een heupfractuur*. 2010 [cited 2012 02-27]; Available from: www.nivel.nl.
34. Rademakers, L., Vainas, T., van Zutphen, S., Brink, P. & van Helden, S., *Pressure Ulcers and Prolonged Hospital Stay in Hip Fracture Patients Affected by Time-to-Surgery.* European Journal of Trauma and Emergency Surgery, 2007. **3**: p. 238-244.
35. Weingarten, S., Riedinger, M., Sandhu, M. et al., *Can practice guidelines safely reduce hospital length of stay? Results from a multicenter interventional study.* The American Journal of Medicine, 1998. **105**: p. 33-40.
36. Rahmqvist, M., *Patient satisfaction in relation to age, health status and other background factors: a model for comparison for care units.* International Journal for Quality in Health Care, 2001. **13**: p. 385-390.
37. Jaipaul, C.R., G., *Are older patients more satisfied with hospital care than younger patients?* Journal of Gerneral Internal Medicine, 2003. **18**: p. 23-30.
38. González-Salvador, T., Lyketsos, C., Baker, A., et al. , *Quality of life in dementia patients in long-term care.* International Journal of Geriatric Psychiatry, 2000. **15**: p. 181-189.
39. Kim, S., Losina, E., Solomon, D., Wright, J. & Katz, J., *Effectiveness of clinical pathways for total knee and total hip arthroplasty: literature review.* Journal of Arthroplasty 2003. **18**: p. 69-74.
40. Clarke, A., *Why are we trying to reduce length of stay? Evaluation of the costs and benefits of reducing time in hospital must start from the objectives that govern the change.* Quality in Health Care, 1996. **5**: p. 172-179.
41. Gearing, R., Mian, I., Barber, J. & Ickowicz, A., *A methodology for conducting retrospective chart review research in child and adolescent psychiatry.* Journal of the Canadian Academy of Child and Adolescent Psychiatry 2006. **15**: p. 126-134.
42. Colón-Emeric, C., Schenck, A., Gorospe, J., et al. , *Translating evidence-based falls prevention into clinical practice in nursing facilities: Results and lessons from a quality improvement collaborative.* . Journal of American Geriatric Society, 2006. **54**: p. 1414-1418.
43. Leigheb, F., Vanhaecht, K., Sermeus, W., et al., *The effect of care pathways for hip fractures: a systematic review.* Calcified Tissue International, 2012. **9**: p. 1-14.
44. Jenkinson, C., Coultier, A. & Bruster, S., *The Picker Patient Experience Questionnaire: development and validation using data from in-patient surveys in five countries.* International Journal for Quality in Health Care, 2002. **14**: p. 353-358.
45. Bensing, J., *Bridging the gap - The separate worlds of evidence-based medicine and patient-centered medicine.* Patient, Education and Counselling, 2000. **39**: p. 17-25.
46. O'Malley, N., Blauth, M., Suhm, N. & Kates, S., *Hip fracture management, before and beyond surgery and medication: a synthesis of the evidence.* Archives of Orthopaedic and Trauma Surgery, 2011. **131**: p. 1519–1527.
47. Gill, L.W., L., *A critical review of patient satisfaction.* Leadership in Health Services, 2009. **22**: p. 8-19.
48. Fox, J.S., D., *A different approach to sociodemographic predictors of satisfaction with health care.* Social Science and Medicine, 1981. **15**: p. 557- 564.

49. Linder-Pelz, S., *Toward a theory of patient satisfaction.* Social Science and Medicine, 1982. **16**: p. 577-582.
50. Fitzpatrick, R.H., A., *Problems in the conceptual framework of patient satisfaction research: an empirical exploration.* Sociology of Health and Illness, 1983. **5**: p. 297-311.
51. Ware, J., Snyder, M., Wright, W. & Davies, A., *Defining and measuring patient satisfaction with medical care.* Evaluation and Program Planning, 1983. **6**: p. 247-263.
52. Donabedian, A., ed. *Explorations in quality assessment and monitoring: The definition of quality and approaches to its assessment.* 1980, Health Administration Press: Ann Arbor, Michigan.
53. Avis, M., Bond, M. & Arthur, A., *Satisfying solutions? A review of some unresolved issues in the measurement of patient satisfaction.* Journal of Advanced Nursing, 1995. **22**: p. 316-322.
54. Williams, B., *Patient satisfaction: a valid concept?* Social Science & Medicine, 1994. **38**: p. 509-516.
55. Rao, M., Clarke, A, Sanderson, C & Hammersley, R., *Patients' own assessments of quality of primary care compared with objective records based measures of technical quality of care: cross sectional study.* British Medical Journal, 2006. **333**: p. 19-22.
56. Hopkins, A., Gabbay, J. & Neuberger, J., *Role of users of health care in achieving a quality service.* Quality in Health Care, 1994. **3**: p. 203-209.
57. Hardy, G., West, M. & Hill, F., *Components and predictors of patient satisfaction.* British Journal of Health Psychology, 1996. **1**: p. 65-85.
58. Westaway, M., Rheeder, P., van Zijl, D. & Seager, J., *Interpersonal and organizational dimensions of patients satisfacation: the moderating effects of health status.* International Journal for Quality in Health Care, 2003. **15**: p. 337-344.
59. Stevens, M., Reininga, I., Boss, N. & van Horn, J., *Patient satisfaction at and after discharge - Effect of a time lag.* Patient Education and Counseling, 2006. **60**: p. 241–245.
60. Larsen, D., Attkisson, C., Hargreaves, W., Nguyen, T., *Assessment of client/patient satisfaction: Development of a general scale.* Evaluation and Program Planning, 1979. **2**: p. 197-207.
61. de Brey, H., *A cross-national validation of the client satisfaction questionnaire: the Dutch experience.* Evaluation and Program Planning, 1983. **6**: p. 395-400.
62. Stubbe, J., Gelsema, T. & Delnoij, D., *The Consumer Quality Index Hip Knee Questionnaire measuring patients' experiences with quality of care after a total hip or knee arthroplasty.* BMC Health Services Research, 2007. **7**: p. 60.
63. Stubbe, J., & van Dijk, L., ed. *Het discriminerend vermogen van de CQ-index Heup-/ Knieoperatie*. 2007, Nivel: Utrecht.
64. Blumenthal, D., *Quality of Care — What is It?* New England Journal of Medicine, 1996. **335**: p. 891-894.
65. DeVellis, R., ed. *Scale Development – Theory and Application*. 2003, Sage Publications: Thousand Oaks.

Appendix A

Categorization of the postoperative complications

Delirium is counted separately.

Table A Complications with relation to the hip fracture surgery

Light	Severe
wound hematoma	pressure ulcers
wound leakage	profound wound infection
bloodstained wound leakage	osteosynthesis is failing (reoperation due to
blisters caused by plaster	technical causes)
superficial wound infection	subsequent bleeding which causes re-operation

Table B Complications with relation to the general health

Light	Severe
drowsiness	atrial fibrillation
diarrhea	cerebrovascular accident
diverticulitis	respiratory insufficiency
depression	post hypertensive encephalopathy
low saturations	shortness of breath
hypertension	colitis
hypocalcaemia	cholangitis
dysphagia	disrupted renal functioning
low blood pressure	aspiration pneumonia
stenosis of the arteria femoralis superficialis	Noro-virus
anemia	hemodynamic instability
low hemoglobin	decompensatio cordis
disrupters in electrolytes, renal functioning and	myocardial infarction
fluid balance	pulmonary embolism
oliguria	
urinary tract infection	
bladder retention	

Appendix B

Patient satisfaction

Designing the patient satisfaction questionnaire

In order to evaluate the quality of care, besides the health outcomes, the patient satisfaction was measured. The importance of such a quality measure, the possible pitfalls in designing patient satisfaction questionnaires as well as the development of the questionnaire used in this study is described in the following.

Traditionally, assessments of medical care did not take patients' reports into account. Health care provision was assessed in terms of technical and physiological reports of outcomes [44]. Nowadays there is increasing interest in gathering feedback from patients to evaluate performance and quality of care [44]. The evaluation of health care has moved away from only clinically effective and evidence–based care. Due to the rise of the health consumer movement, it has moved towards placing the 'whole' person at the centre of medicine. Patient-centred outcomes which can help to improve the quality of clinical care include physical function, psychological well being, quality of life (QOL) and patient satisfaction [45].

At the Isala clinics the geriatric patient with a hip fracture will soon be co-managed by a team of a surgeon and a geriatrician, this is expected to lead not only to more patient safety but also more patient centeredness [46]. Before the implementation of this approach, one tried to assess the current level of satisfaction. To provide a good patient satisfaction questionnaire, one needs to know what patient satisfaction exactly is. There is still no consensus about the definition and there is no uniformity regarding which conceptual facets the concept of patient satisfaction encompasses. According to Gill and White [47] five key theories can be identified. Fox and Storms [48] state that people differ in their orientation toward care. They have different expectations and wishes towards health care. Care providers, on the other hand, differ in their conditions of care. Differences occur, for example, in theoretical approaches and outcomes of care. If orientations and conditions are the same, patients are satisfied and otherwise they are dissatisfied. Linder-Pelz [49] says that satisfaction is mediated by personal beliefs and values about care as well as prior expectations of the care. A somewhat different approach is taken by Fitzpatrick and Hopkins [50]. They argue that satisfaction consists of three independent determinants: the socially created expectations, the goal of help-seeking and the importance of emotional needs. The first determinant explains cultural differences in the degree of satisfaction perceived toward a particular health care service. The second determinant states that patients' varying concerns with regard to their illness explain partly their different responses to medical consultations. The last determinant stresses the emotional component of health care provision. Often health care problems cause feelings of uncertainty and anxiety in patients. Ware et al. [51] argues that patient satisfaction is a function of patients' subjective responses to experienced care mediated by personal preferences and expectations. Ware argues that patient characteristics are the determinants of satisfaction, whereas interpersonal manner, technical quality, accessibility, cost, efficacy, continuity, the physical environment and availability of resources are the components of satisfaction. Implicit to Ware's definition of patient satisfaction as a multidimensional concept with dimensions that correspond to the major characteristics of providers and services' is Donabedian's [52] interpersonal process and

organizational attributes. Donabedian proposes that patient satisfaction is based on personal relationships within health care systems and health care outcomes from treatment, where these were mediated by the values of the patient [52].

Besides several theories also many different questionnaires exist. The assessment of patient satisfaction is used by physicians to investigate the extent to which their service meets the needs of their client group [53]. Several researchers, however, question the validity of the questionnaires used [47, 54]. Furthermore the patient's capability to evaluate health services and professionals' skills are questioned [55]. According to Hopkins et al. [56] patients are less capable of judging technical competence because of a real informative asymmetry and they are not likely to express critical comments with regard to the abilities of physicians.

Nevertheless studies demonstrate that satisfied patients are more likely to utilize health services, comply with medical treatment, continue with the health care provider and recommend the hospital to others [57, 58]. The outcomes of those questionnaires depend on the questions itself but also on patients' expectations, patient characteristics and psychosocial determinants. Also the point in time of the assessment can cause differences. The patients' point of view may change over time. The level of satisfaction may be interpreted differently during hospitalization and after discharge [59]. Furthermore studies show that patient satisfaction is related to interpersonal competence, more specific with clear communication and information, more partnership building, service availability and waiting time [58].

The questionnaire used in this study was developed according to three steps. The steps involved a qualitative, constructive and cognitive step. At first a qualitative approach was taken. More specifically a literature review was carried out. This literature review identified several general but well validated questionnaires [60]. Those questionnaires were already widely used in research or as quality indicators in the Netherlands [61]. Furthermore it was searched for questionnaires designed especially for elderly patients and for questionnaires already used in studies comparable to the current one [23, 62]. The literature review identified three helpful questionnaires as well as additional articles about developing patient satisfaction surveys.

A widely used measurement is the CSQ-8. This is a shorter version of the Client Satisfaction Questionnaire [60]. This questionnaire evaluates general satisfaction. It has a high internal consistency (Cronbach's alpha 0.92-0.93 for 8-item scale; [60]). A validated Dutch version exists [61]. Another questionnaire is the CQ-index Heup/knieoperatie (Ziekenhuiszorg), which is based on the internationally-wide used surveys CAHPS and QUOTE [63]. This questionnaire is used to assess patients' experiences with and evaluations of quality of care after a total hip or total knee arthroplasty. It has a good internal consistency (Cronbach's alpha 0.76 to 0.90), however due to overall high satisfaction levels the questionnaire has a low ability to discriminate between hospitals [62]. Blonk Centen, Wijnen, Jansen & van Loon [23] developed their own patient satisfaction questionnaire in the context of the evaluation of their implementation of a multidisciplinary treatment concept. Their questionnaire is developed by the orthopaedic team based on their own experiences. However, they did not validate the questionnaire.

The second step was the constructive step. Based on results from the literature review, it was chosen to measure three aspects of patient satisfaction. Those aspects were satisfaction with the

quality of care provided by nurses, satisfaction with the quality of care provided by physicians and overall satisfaction with received health care. It was thought that those aspects have the main influence on the patient satisfaction. According to Blumenthal [64] quality of care has two dimensions. It consists of the technical dimensions which states that one should to the right thing and make the right decisions. The second dimension describes the quality of the interaction between health care professional and patient. The patient has to have the perception of being well cared for. Both dimensions were taken into account in the questionnaire. The physicians, for example, are seen as the technical dimension. They are expected to do the right thing in order to cure the patients. The nurses on the other hand, form the main contact point for the patient. Patients see, talk and experience the nurses more than any other health professional. Therefore nurse are of great influence to patient satisfaction [57, 63]. The third aspect measured the overall satisfaction. Therefore the patient was asked if he/she would recommend the hospital to friend. This question is also used in the CSQ-8, which is a shorter version of the Client Satisfaction Questionnaire [60].

It was chosen to use a scale with four response categories. This offered variance within the scale, which enabled the measure to covariance. “If a scale fails to discriminate differences in the underlying attribute, its correlations with other measure will be restricted and its utility will be limited” [65]. Furthermore, with four categories respondents were expected to still be able to discriminate meaningfully [65]. Too many options would lead to a threat of random error rather than a reflection of the actual difference in the phenomenon being measured.

At the end the cognitive step was taken. The questionnaire was judged by health care professionals as well as health care researchers. The questions were evaluated according to their comprehensibility, clarity, relevance and unambiguousness.

Zwolle, April 2012

Geachte meneer, mevrouw,

Wij willen u in de Isala Klinieken graag de beste zorg geven. Bent u zelf tevreden over de zorg die u heeft gekregen? Of kan de zorg nog beter? Uw mening is belangrijk.

Daarom willen wij u vragen de vragenlijst in te vullen. Dit kost slechts 5 minuten tijd.
Bij voorbaat hartelijk dank.

Met vriendelijke groet,

Sarah Janus

Onderzoeker
Isala klinieken & Universiteit Twente

Instructie:

U kunt antwoorden door steeds één hokje in te kleuren. De ingevulde vragenlijst wordt vertrouwelijk behandeld, en de gegevens worden anoniem verwerkt. Uw naam komt niet voor op de vragenlijst.

1 Wat is uw geslacht?

O vrouw O man

2 Wat is uw leeftijd?

_____

3 De vragenlijst wordt ingevuld door?

O de patiënt O een naaste van de patiënt O beide samen O patiënt en onderzoeker samen

4 Hebben de verpleegkundigen snel gereageerd als u pijn of ander klachten uitte?

O Ja, zeker O Ja, in het algemeen wel O Nee, nauwelijks O Nee, beslist niet

5 Hebben de verpleegkundigen uitgebreide activiteiten (zoals wassen) naar uw tevredenheid uitgevoerd?

O Ja, zeker O Ja, in het algemeen wel O Nee, nauwelijks O Nee, beslist niet

6 Hebben de verpleegkundigen voldoende tijd voor uw zorg gehad?

O Ja, zeker O Ja, in het algemeen wel O Nee, nauwelijks O Nee, beslist niet

7 Nemen de artsen de tijd voor u?

O Ja, zeker O Ja, in het algemeen wel O Nee, nauwelijks O Nee, beslist niet

8 Komen de artsen deskundig over?

O Ja, zeker O Ja, in het algemeen wel O Nee, nauwelijks O Nee, beslist niet

9 Bent u tevreden over uw behandeling door de artsen?

O Zeer tevreden O Tamelijk tevreden O Tamelijk ontevreden O Zeer ontevreden

10 Sinds begin van u opname: Hebben de artsen of verpleegkundigen u geïnformeerd over het verloop van de behandeling?

O Ja, zeker O Ja, in het algemeen wel O Nee, nauwelijks O Nee, beslist niet

11 Hebben de artsen of verpleegkundigen u geïnformeerd waarom u medicijnen nodig heeft?

O Ja, zeker O Ja, in het algemeen wel O Nee, nauwelijks O Nee, beslist niet

12 Stel dat een van uw vrienden of kennissen dezelfde hulp nodig heeft, zou u dan Isala Klinieken aanbevelen?

O Ja, zeker O Ja, ik denk van wel O Nee, ik denk van niet O Nee, beslist niet

13 Hoe tevreden bent u over het geheel genomen met de zorg die u in het ziekenhuis?

O Zeer tevreden O Tamelijk tevreden O Tamelijk ontevreden O Zeer ontevreden

Hebt u verder nog opmerkingen over de zorg of de vragenlijst?

Na het invullen van de vragenlijst, kunt u deze inleveren bij een arts of een verpleegkundige.

Hartelijk bedankt voor uw medewerking!

Appendix C

Physician satisfaction

Semi-structured interviews

The physician form one of the main stakeholder groups within the hospital. They are jointly responsible for the success of the implementation of different program to improve quality of care. In this study the aim of the semi-structured interview is to explore the opinions and feelings toward the current quality of care for elderly patients with a hip fracture.
The interviews are expected to answer the following questions:

- How satisfied are the physicians with the current treatment?
- What is positive about the current treatment? What is negative about the current treatment?
- What needs to be changed?

Interview and results:

In 2012 is de Isala kliniek in Zwolle van plan om een nieuw behandelconcept voor patiënten vanaf 70 jaar met een heupfractuur te gaan implementeren. Ik wil het effect van de interventie gaan evalueren. Hiervoor wil ik graag de mening van de betrokken artsen voor en na de implementatie in kaart brengen. Hiervoor wil ik u graag kort gaan interviewen.

Bij voorbaat hartelijk dank voor uw medewerking!

Naam van de arts
1 Arts werkt op de afdeling
physician A, physician B, physician C, physician assistant, physician D
(this is not shown in order to protect the anonymity of the respondents)

2 Hoe ziet het zorgtraject voor heuppatiënten er momenteel uit?

Physician A: Patiënt komt van de SEH naar de afdeling B3, dan of daarvoor operatie door traumachirurgie/ orthopedie, dan naar huis/ verpleeghuis Bij delirante patiënten komt de geriatrische internist in consult
Physician B: SEH assistent meldt patient aan, roept als nodig consulten, anaesthist roept als nodig consulten, patiënt komt naar B3, operatie vindt plaats, patiënt komt weer naar B3, arts assistenten roepen als nodig specialisten, patiënt gaat naar huis/ verpleeghuis
Physician C:

Patiënt wordt opgenomen op chirurgie, behandeld, nabehandeling op de poli
Physician assistant: Patiënt wordt opgenomen op chirurgie, behandeld, nabehandeling op de poli
Physician D: Patiënt wordt komt van de SEH naar de OK, dan naar de afdeling, dan naar huis/revalidatie.

3 Hoe beoordeelt u de kwaliteit van de zorg die oudere patiënten met een heupfractuur ontvangen (op dit moment)?

	Physician A:	Physician B:	Physician C:	Physician assistant:	Physician D:
Zeer goed					
Goed					
Redelijk		x	x (te weinig personeel)	x	x (liggen niet langer dan nodig, doorstroom-tijd redelijk)
Slecht	x				

4 Welke aspecten van dit behandelconcept ervaart u als positief (voor patiënten en artsen)?

Physician A: geen
Physician B: alle disciplines zijn in het ziekenhuis aanwezig
Physician C: alle disciplines zijn in het ziekenhuis aanwezig
Physician assistant: snelle mobilisatie (fysiotherapie), betrokkenheid van transferverpleegkundigen voor de nazorg
Physician D: meestal binnen 24 uur geopereerd

5 Welke aspecten van dit behandelconcept ervaart u als knelpunt of, als problematisch (voor patiënten en artsen)?

Physician A: internist wordt niet meeteen in consult gevraagd (bij aankomst ouderen op de SEH)
Physician B: arts-assistenten hebben te weinig kennis van de interne geneeskunde, kunnen comorbideit niet goed in schatten, nauwelijks communicatie tussen chirurgen en internisten
Physician C: er is te weinig personeel, er zijn te veel jonge arts assistenten – deze hebben te weinig ervaringen, er is te weinig supervisie voor hen
Physician assistant: lange klinische ligduur i.v.m. wachten op revalidatie plek
Physician D: OK wordt vaak opgeschoven ten nadele van de fractuur, patiënt wordt later (later op de dag) geopereerd

6 Wat zou men moeten veranderen om de zorg voor patiënten met een heupfractuur te verbeteren?

Physician A: Bij het moment van opname moet de internist in consult worden gevraagd; Consult kan door internist, arts-assistent of nurse practitioner plaats vinden
Physician B: Internist moet hoofdbehandelaar worden, chirurg wordt in consult gevraagd; anders samen visite lopen, spreekuurtje (arts assistenten chirurgie overleggen samen met geriater)
Physician C: er moet meer ervaren personeel aanwezig zijn, patiënten moeten goed gecontroleerd worden door ervarene artsen
Physician assistant: een vast aanspreekpunt binnen de interne geneeskunde
Physician D: een eigen trauma kamer voor fracturen

7 Wanneer wordt er (momenteel) contact opgenomen met de geriatrische internist en door wie?

Physician A: arts assistent chirurgie -> arts assistent internist
Physician B: arts assisten roepen als nodig de specialisten
Physician C: na de operatie wordt er als nodig contact door arts assistent met internist opgenomen
Physician assistant: bij tekenen van delier, bij multiple medicatie gebruik, bij indicatie voor de valpoli
Physician D: Zaalarts neemt contact op met de geriatrische internist bij patiënten boven de 85 en patiënten met comorbiditeit

8 Hoe verloopt de communicatie tussen chirurg en geriatrische internist?

Physician A: aanvraagformulier consult
Physician B: aanvraagformulier consult
Physician C: er is geen communicatie, arts assistenten communiceren onder elkaar
Physician assistant: bij “interne” problemen (elektrolytenstoornissen, nierfunctiestoornissen, trombopenie, vochtbeleid e.d.) wordt nu de dienstdoende consultent van de interne in consult gevraagd en niet de geriatrische internist
Physician D: Chirurg heeft geen contact met geriatrische internist

9 Is meer communicatie tussen chirurg en geriatrische internist nodig om de zorg optimaal op elkaar af te stemmen?

Physician A: Nee, als de consult aanvraag wordt gedaan is dat genoeg
Physician B: ja ook over het zorgpad
Physician C: niet per se
Physician assistant: Ja een vast aanspreekpunt binnen de interne geneeskunde is wenselijk
Physician D: Nee assistenten regelen dit

10 Bent u voor de invoering van een co-managed behandelconcept voor oudere patiënten met een heupfractuur?

	Physician A:	Physician B:	Physician C:	Physician assistant:	Physician D:

Ja	x	x	x	x	
Nee					x

11 Hebt u verder nog opmerkingen over de zorg of de vragenlijst?

-

Appendix D

Analysis of the data with regards to differences between patients with a preoperative consult versus patients with no preoperative consult

Table 1 Results of the demographic characteristics of the two groups

	Geriatric Consult (preoperative)	**No Geriatric Consult (preoperative)**	**p-value**
Number patients	14	57	
Gender			
○ men (%)	5 (36)	20 (35)	
○ women (%)	9 (64)	37 (65)	0.21
Age (mean, SD)	84.1 (6.4)	81.8 (7.3)	0.97
Accommodation before admission (%)			
○ home	8 (57)	38 (67)	
○ residential home	4 (29)	10 (18)	
○ nursing home	1 (7)	7(12)	
○ other	1 (7)	2 (4)	0.69
Accommodation after hospital stay (%)			
○ home	1 (7)	18 (32)	
○ residential home	4 (29)	16 (28)	
○ nursing home	6 (43)	17 (30)	
○ other	3 (21)	6 (11)	0.25
Fracture type (%)			
○ femoral neck fracture	7 (50)	26 (46)	
○ pertrochanter femur fracture	4 (29)	25 (44)	
○ subtrochanter femur fracture	1 (7)	2 (4)	
○ other	2 (14)	4 (7)	0.63
Repair techniques (%)			
○ hemi-arthroplasty	9 (64)	26 (45)	
○ gamma-nail	4 (29)	22 (39)	
○ dynamic hip screw	1 (7)	8 (14)	
○ femur pen	0 (0)	-	
○ other	-	1 (2)	0.62
ASA classification (%)*			
I	0 (0)	3 (5)	
II	2 (14)	17 (30)	
III	6 (43)	21 (37)	
IV	1 (7)	1 (2)	
V	0	0	
VI	0	0	0.37

*ASA classification= classification of co morbidity and preoperative diseases according to the American Society of Anaesthesiologists; I = healthy patient; VI= brain-dead patient; missing: Geriatric group N=5, 35%; No Geriatric N=15, 26%

Table 2 Results of the outcome measures of the two groups

	Geriatric preoperative N = 14	**No Geriatric preoperative N = 57**	p-value
Primary outcome measure			
Length of stay (mean, SD)	9.1 (9.2)	8.0 (4.9)	0.91
Secondary outcome measure			
Consultations Geriatric (%)			
Post	2 (14)	11 (19)	0.19
Complications (%)			
Delirium	1 (13)	8 (14)	0.49
In-hospital deaths (%)	2 (14)	3 (5)	0.24
Time to surgery within 24 hours	8 (57)	46 (81)	0.06
Complications (%)			
Related to surgery			0.55
o Light	2 (14)	10 (18)	
o Severe	0 (0)	4 (7)	
o None	12 (86)	43 (75)	
General			0.54
o Light	6 (43)	16 (28)	
o Severe	1 (7)	7 (12)	
o None	7 (50)	34 (60)	
Consultations			
o internist	3 (21)	25 (43)	0.12
o pulmonary physician	3 (21)	7 (12)	0.38
o cardiologist	1 (7)	23 (40)	0.02
o other	2 (14)	10 (18)	0.77
Change in accommodation (%)			
o home	1 (7)	17 (30)	
o home-residential/nursing home	4 (29)	18 (32)	
o residential home	3 (21)	5 (9)	
o residential-nursing home	1 (7)	4 (7)	
o nursing home	1 (7)	3 (5)	
o nursing-residential home	0 (0)	3 (5)	
o other	4 (29)	7 (12)	0.36
Costs in € (mean, SD)	10699 (11569)	8222 (7312)	0.49

Appendix E

Results of the patient satisfaction questionnaire

Comparison of “patient satisfaction” group with the remaining group of 2012

Table A Demographic characteristics

	Patients asked	Remaining patients	P-value
Number patients	12	58	
Sex			
○ men (%)	4 (33)	37 (64)	
○ women (%)	8 (67)	21 (36)	0.85
Age (mean, SD)	77.5 (4.9)	83.4 (6.9)	0.05
Accommodation before admission (%)			
○ home	10 (83)	35 (60)	
○ residential home	1 (8)	13 (22)	
○ nursing home	0	8 (14)	
○ other	1 (8)	2 (4)	0.26
Fracture type (%)			
○ femoral neck fracture	6 (50)	27 (47)	
○ pertrochanter femur fracture	5 (42)	23 (40)	
○ subtrochanter femur fracture	0	3 (5)	
○ other	1 (8)	5 (9)	0.88
Repair technique (%)			
○ hemi-arthroplasty	8 (67)	27 (47)	
○ gamma-nail	2 (17)	24 (41)	
○ dynamic hip screw	2 (17)	6 (10)	
○ femur pen	0	0	
○ other	0	1 (2)	0.39
ASA classification (%)*			
I	0	2 (5)	
II	5 (83)	14 (32)	
III	1 (17)	26 (59)	
IV	0	2 (5)	
V	0	0	
VI	0	0	0.11

*missing: before group N=6, 50%; remaining group N=14, 24%

Table B Primary and secondary outcome measures

	Patients asked	Remaining patients	P-value
Primary outcome measure			
Length of stay (mean, SD)	8.0 (4.9)	8.3 (6.2)	0.54
Secondary outcome measure			
In-hospital deaths (%)	0 (100)	5 (9)	0.29
Consultations other specialism's (%)			
○ internist	5 (42)	22 (38)	0.81
○ pulmonary physician	2 (17)	8 (14)	0.80
○ cardiologist	1 (8)	22 (38)	0.05
○ other	2 (17)	10 (17)	0.96
Consultations Geriatric (%)			
○ pre	2 (17)	12 (20)	0.75
○ post	0	16 (27)	0.04
Time to surgery within 24hours (%)	10 (83)	43 (75)	0.49
Complications (%)			
Delirium	0	9 (15)	0.14
Related to surgery			
○ Light	1 (8)	11 (19)	
○ Severe	1 (8)	3 (5)	0.64
General			
○ Light	3 (15)	19 (32)	
○ Severe	0	8 (14)	0.27
Accommodation after hospital stay (%)			
○ Home	6 (50)	12 (21)	
○ Residential home	3 (25)	17 (29)	
○ Nursing home	3 (25)	20 (34)	
○ Other	0	9 (16)	0.14
Costs (mean, SD)	8097 (5076)	8921 (8874)	0.72

Table 2 Results of the patient satisfaction questionnaires

Total	12	
Sex (%)		
Female	8	(67)
Male	4	(33)
Age mean (SD)	76	(4.9)
Question		
Q 3 (%)	De vragenlijst wordt ingevuld door?	
Patient and researcher	12	(100)
Q 4 (%)	Hebben de verpleegkundigen snel gereageerd als u pijn of ander klachten uitte?	
Yes certainly	11	(92)
Yes generally speaking	1	(8)
Q 5 (%)	Hebben de verpleegkundigen uitgebreide activiteiten (zoals wassen) naar uw tevredenheid uitgevoerd?	
Yes certainly	12	(100)
Q 6 (%)	Hebben de verpleegkundigen voldoende tijd voor uw zorg gehad?	
Yes certainly	8	(67)
Yes generally speaking	4	(33)
Q 7 (%)	Nemen de artsen de tijd voor u?	
Yes certainly	2	(17)
Yes generally speaking	8	(67)
No hardly	2	(17)
Q 8 (%)	Komen de artsen deskundig over?	
Yes certainly	9	(75)
Yes generally speaking	3	(25)
Q 9 (%)	Bent u tevreden over uw behandeling door de artsen?	
Very satisfied	8	(67)
Quite satisfied	3	(25)
Quite unsatisfied	1	(8)
Q 10 (%)	Sinds begin van u opname: Hebben de artsen of verpleegkundigen u geïnformeerd over het verloop van de behandeling?	
Yes certainly	6	(50)
Yes generally speaking	5	(42)
No hardly	1	(8)
Q 11 (%)	Hebben de artsen of verpleegkundigen u geïnformeerd waarom u medicijnen nodig heeft?	

Yes certainly	6	(50)
Yes generally speaking	6	(50)

Q 12 (%)	Stel dat een van uw vrienden of kennissen dezelfde hulp nodig heeft, zou u dan Isala Klinieken aanbevelen?	
Yes certainly	4	(33)
Yes I think so	8	(67)

Q 13 (%)	Hoe tevreden bent u over het geheel genomen met de zorg die u in het ziekenhuis?	
Very satisfied	10	(83)
Quite satisfied	2	(17)

Q 14	Hebt u verder nog opmerkingen?
	The food is very good; not much contact with the physicians