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Minimal impact of a care pathway for geriatric hip fracture patients

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ABSTRACT

Background Adherence to guidelines for patients with proximal femur fracture is suboptimal.

Objective To evaluate the effect of a care pathway for the in-hospital management of older geriatric hip fracture patients on adherence to guidelines and patient outcomes.

Design The European Quality of Care Pathway study is a cluster randomized controlled trial.

Setting 26 hospitals in Belgium, Italy and Portugal.

Subjects Older adults with a proximal femur fracture (n=514 patients) were included.

Methods Hospitals treating older adults (>65) with a proximal femur fracture were randomly assigned to an intervention group, i.e. implementation of a care pathway, or control group, i.e. usual care. Thirteen patient outcomes and 24 process indicators regarding in-hospital management, as well as three not-recommended care activities were measured. Adjusted and unadjusted regression analyses were conducted using intention-to-treat procedures.

Results In the intervention group 301 patients in 15 hospitals were included, and in the control group 213 patients in 11 hospitals. Sixty-five percent of the patients were older than 80 years. The implementation of this care pathway had no significant impact on the thirteen patient outcomes. The preoperative management improved significantly. Eighteen of 24 process indicators improved, but only two improved significantly. Only for a few teams a geriatrician was an integral member of the treatment team.

Discussion Implementation of a care pathway improved compliance to evidence, but no significant effect on patient outcomes was found. The impact of the collaboration between surgeons and geriatricians on adherence to guidelines and patient outcomes should be studied.

Trial registration ClinicalTrials.gov: NCT00962910

KEYWORDS

Care pathway, hip fracture, geriatric, cluster randomized controlled trial, quality improvement

INTRODUCTION

Hip fractures are a leading cause of disability and mortality in older people. In the United States, the incidence of hip fracture is expected to increase to over 500,000 per year by 2040¹. Recent mortality 6 months after fracture is about 23%². Readmission rates are also high. Up to 46.5% of patients are readmitted within 6-months after discharge³. Patients also experience a decreased quality of life and a decline in functional status⁴. Functional status at discharge strongly predicts functional status and quality of life one year after the fracture⁵. Patient outcomes are influenced by an adequate pre-, peri- and postoperative management of the fracture⁶. Several guidelines on geriatric hip fracture treatment have been developed⁷⁻⁹ but care remains suboptimal^{10, 11}.

Care pathways (CPs) facilitate the implementation of evidence through the integration of evidence-based key interventions^{12, 13}. Findings on the effectiveness of CP are however inconclusive¹⁴⁻¹⁶. A possible explanation is that each CP only deals with a few aspects of the care process¹⁷. Further investigation of their impact on adherence to guidelines and patient outcomes is warranted. The aim of this international cluster randomized controlled trial is to evaluate the effect of a care pathway for the in-hospital management of older proximal femur fracture patients on adherence to guidelines and patient outcomes.

MATERIALS AND METHODS

Study design and participants

A pragmatic cRCT was conducted in Belgium, Ireland, Italy and Portugal. General hospitals with hospitalized patients with a proximal femur fracture (PFF) were randomized to either an

intervention group, where a CP was implemented, or a control group, where usual care was delivered. The CP was developed and implemented at hospital level and hospitals randomized in the control group were offered the opportunity to develop a CP one year after the study. An overview of the study design is shown in figure Appendix 2. More information of the methods, Appendix 1, is presented as supplementary data.

The intervention

Hospitals were asked to develop and implement a CP, based on the 7-phase protocol¹⁸. The clinical evidence for the CP was provided by the researchers based on an extensive literature review and international Delphi study and the intervention contained three active components¹³. The first active component was the assessment of the quality and the organization of the care process. Second, a set of evidence-based key interventions was provided to the hospitals, which have a significant impact on patient outcomes. Teachings sessions were organised by an interdisciplinary faculty consisting of an expert in CP and orthopaedic surgeon, during the implementation phase, focusing on key interventions for which team experienced implementation difficulties. The last active component was training on developing and implementation. In each hospital a CP facilitator was trained to develop and implement a CP based on the findings of the evaluation of the care process and the set of key interventions¹⁸. A CP was developed over a 6-month period. In the control group no intervention was implemented, meaning usual care was provided. In Appendix 1 more information of the intervention can be found.

Variables and outcome measures

The process and outcome indicators were selected based on a literature review, an international Delphi survey and expert advice by using an 8-step method¹⁹. (see figure Appendix 3) Primary patient outcome was 6-month mortality rate. Secondary patient outcomes included 30-day

mortality rate, 30-day and 6-month PFF specific readmission rate and functional status, length of stay, mobility status and proportion of patients returning to previous residential status at 30 days and 6 months after discharge. EQ5D (EuroQol 5D) and SF36 (Short Form Health Survey 36) were measured at 30 days after discharge. For 30-day and 6-month outcomes, except for mortality, evidently only patients still alive were included in the analyses. The 24 process indicators are characterized by interventions related to preoperative management (n=7), perioperative management (n=2) and postoperative management (n=15). Also, three additional process indicators relating to not-recommended care were measured. Finally, twelve variables, including demographic and PFF-specific data, were measured.

The measurements started 2- to 3-months after the end of the implementation period¹³. The study coordinator performed the analysis to prevent assessment bias. All data were collected centrally in each hospital. Data-input was performed in a central database at KU Leuven - University of Leuven, and guided by using a rigorous data-input protocol.

Statistical analysis

Patient and hospital characteristics were compared by using the Chi-square test, Mann-Whitney U-test and independent samples t-test for categorical, ordinal, and continuous variables, respectively.

Outcome and process indicators were analyzed by using a two level mixed-effects logistic and linear regression model for categorical and continuous variables respectively. For the outcome indicators, following covariates were included in the model: age, gender, type of surgery and Charlson comorbidity index. For the process indicators, no covariates were included because only patients who were found eligible for these individual process indicators were included. Adherence to all the process indicators was calculated as the rate of individually applicable

process indicators that were adhered to. First, the data of the intervention group after implementation of a CP was compared to the control group (figure Appendix 2, cRCT). Second, as this is also a quality improvement project, the data of the intervention group were analyzed as a pre-posttest (figure Appendix 2, pre-posttest). Statistical significance was defined as a two-sided *P*-value of 0.05. All analyses were intention-to-treat, performed by using R package lme4 software version 3.1.0 and Mplus 7.3 for ICC calculations.

RESULTS

Description of study population

Initially, 69 hospitals agreed to participate in the study. After receiving the detailed study protocol, 26 hospitals decided to participate (Figure Appendix 4). Thirty-four hospitals did not participate due to internal reorganization or a high workload. One country, Ireland, including 9 hospitals, dropped out.

Fifteen hospitals were allocated to the intervention group, and 11 hospitals to the control group. In total 514 patients participated to the study, with 301 patients included in the intervention group and 213 patients included in the control group. Belgian hospitals included patients between October 2010 and January 2012 while Italian and Portuguese hospitals included patients between January 2013 and May 2014. The lost patients could not be reached by the study coordinator.

Demographics

The intervention and control group were highly comparable regarding the patient and hospital characteristics (see Table 1). Two in five (40.3% in the intervention group and 41.0% in the control group) admitted patients needed help with their daily activities. Four in five (81.5% in the intervention group and 82.8% in the control group) patients lived at home before the fracture.

About 3 in 4 patients were treated for a displaced fracture, and the type of fracture was almost equally distributed for extracapsular and intracapsular fractures. One in five hospitals had more than 600 beds and treated more than 300 patients with PFF yearly. No significant difference was found in the team disciplines between intervention and control group (Table 1).

Impact of a CP on patient outcomes

Unadjusted and adjusted results on outcome indicators between the intervention and control group are shown in Table 2. Implementation of a CP had no impact on PFF specific readmission rate, mortality rate, length of stay, functional status, mobility status, return to previous residential status, EQ5D and SF36.

Impact of a CP on adherence to guidelines

Table 3 give an overview of the process indicators. Eighteen of 24 process indicators were better in the intervention group compared to the control group. Only two of them were significantly better: assessment of prefracture mobility status ($P<0.001$) and adequate pain assessment postoperatively ($P<0.001$). Adherence to all the process indicators was not significantly different between intervention group (mean: $49.02\pm SD: 13.11$) and control group (mean: $42.62\pm SD: 11.76$) ($P=0.170$). Implementation of a CP led to significantly better preoperative management ($P=0.036$) but had no impact on perioperative ($P=0.216$) and postoperative management ($P=0.762$).

Impact of a CP in the intervention group (pre-posttest)

No significant difference was found in patient characteristics in the intervention group before and after implementation of a CP. The pre-posttest of the outcome indicators in the intervention group showed a significantly improved proportion of patients returning home 6-month after

discharge but no impact on the 6-month mortality rate (primary outcome) (Table Appendix 5).

The process indicators showed a significantly improvement in the total care patients received after implementation of a CP. The preoperative and postoperative management significantly improved but no significant impact was found on perioperative management. Nine of 24 measurable process had a significant impact on the care for patients after implementation of a CP (Table Appendix 6).

DISCUSSION

The purpose of this study was to investigate if CPs for older hip fracture patients could lead to better patient outcomes and improved adherence to guidelines, based on an international cRCT¹³. Our study showed that the implementation of this CP has no significant impact on patient outcomes nor on the total adherence to guidelines. Preoperative management was significantly better while no significant impact was found on peri – and postoperative management. If the results of the intervention group were analyzed as a pre-posttest, the proportion of patients returning home 6-month after discharge, the total adherence to guidelines, preoperative management and postoperative management significantly improved.

Our CP led to higher performance of preoperative mobility status and adequate pain assessment in the intervention group compared to the control group. Both improved outcomes are clinically relevant as they may exhibit an indirect impact on patient outcomes²⁰⁻²². To achieve the best patient outcomes, surgeons should pay attention to the whole in-hospital care management²³.

The 6-month mortality rate did not significantly decrease after implementation of our CP (intervention group 11.8%). This mortality rate is lower compared to recent published 6-month mortality rates of 23%². Our 30-day mortality rate in the control group (2.1%) is much lower

than the 6.7% reported by the Royal College of Physicians in 2016²⁴. These lower mortality rates may indicate selection bias.

More than half of patients with hip fracture are over 86 years old and are suffering from multiple comorbidities²⁵. This indicates the need for collaboration between surgeons and geriatricians. Our CP aimed for an orthopaedic ward with integrated care where a multidisciplinary team was created around the patients and standardized treatment paths were implemented²⁶. However, only two of 15 intervention teams included a geriatrician in their team, while in the control group this was in one of the 11 teams. It is possible that this most sophisticated model could not be achieved during the development and implementation of the CP due to the limited time frame. But some teams could have evolved from orthopaedic ward and geriatric consultant service (model 1) to orthopaedic ward and daily consultative service (model 2) or to geriatric and rehabilitation ward and orthopaedic consultant service (model 3)²⁶.

When the EQCP study was initiated end of 2007, little research and experience was available to set up large multi-country cRCTs for CPs¹². Based on the process evaluation of the Belgian data, not all key interventions were included in each CP. At hospital level, between 58% and 94% of the key interventions were included in the CP²⁷. This was due to organizational difficulties or difficulties in convincing the involved team members in the relevance. The latest was expected as for some of these key interventions the level of agreement is low¹⁶. To reduce Hawthorne effect, only one measurement was performed in the control group. The reason behind this is that the measurement of adherence to guidelines and patient outcomes was seen as part of the intervention. This implies that no distinction can be made between the effect of our CP due to measurement effect or due to implementation of our CP. Our pre-post results are only for the intervention group and should be interpreted with caution. Depending on the culture of the

organization the measurement effect can be different. The data collection depended on the documentation of the clinical care provided by the healthcare providers. When something was not mentioned in the patient record, this was seen as not performed, as this can lead to duplication of care. However, there is no reason to assume that underreporting is unequal between both groups. The reliability of the data was guaranteed by the fact that the study coordinators were assisted by a clinician outside the research team to assist with patient record data extraction. Due to the study design, the teams could only perform one Plan – Do – Study – Act cycle, which may be too short to obtain an impact on patient outcomes¹⁴. Hospitals had set some priorities due to the high amount of evidence-based key interventions. This is in line with the seminal work on normalisation theory by May and colleagues (2009) and indicates that this intervention was adopted as it was taken up but not routinely embedded in daily practice²⁸. The importance of time is also noticed in the reports of the National Hip Fracture Database (NHFD). In April 2012, 39.1% of care meets best practice, while in August 2017 this was 55.7%²⁴.

This study has some limitations. The first limitation of this study is the dropout of hospitals (Appendix 4), leading to an underpowered study. There was a dropout of one country due to a health policy decision outside the project²⁹. Although at the beginning of the study a possible drop out was taken into account by randomizing 50% more hospitals than initially needed. Many findings show clinical relevance, but no statistical significance was found due to lack of power. Second, we could not assess the total amount of patients as 7 hospitals (26.9%) submitted their exclusion logbook. A third limitation is the choice of our primary outcome, 6-month mortality¹³. During the study it became clear that this in-hospital CP may improve short-term outcomes but may not yield long-term benefits. Fourth, to reduce the in-hospital length of stay, a comprehensive reorganization of the whole healthcare system should be done, including in-

hospital management and the needed support after discharge. Our CP focused mainly on in-hospital management. Next, the number of patients in each hospital is low, which can lead to more variation. On the other hand, each patient admitted in each hospital should receive all appropriate care activities. Last, we studied adherence to the model CP which gives a reasonable estimate of the implementation status of the CP based on the intention-to-treat principle. However, it does not tell why the full CP was not implemented as originally planned. A more detailed process evaluation could fill this gap and we suggest to include a process evaluation as part of the protocol for future studies³⁰.

CONCLUSION

This study implied that this CP has as a limited impact on care activities that older patients with a hip fracture should receive, with no impact on patient outcomes. Other researchers and clinical teams can be inspired to enhance their intervention to obtain their goals on the improvement of quality and clinical effectiveness. Future research should focus on the active involvement of the geriatrician in the treatment of older patients with PFF, to improve patient outcomes and adherence to guidelines.

CONFLICT OF INTERESTS

The Leuven Institute for Healthcare Policy received an unrestricted grant from the European Pathway Association (E-P-A). E-P-A obtained an unrestricted education grant from Pfizer SA. The funders had no role in the design, data collection, analysis, interpretation of data, writing of the manuscript or decision to submit the manuscript for publication. The autonomy of E-P-A and all involved academic institutions with regard to scientific independence and intellectual property on the methodology was guaranteed. CL received support from the Clinical research fund of UZ Leuven, Belgium during the conduct of the study. KV received research grants from Pfizer SA, Baxter and Astra Zeneca.

The authors declare no other conflicts of interest with respect to the authorship and/or publication of this manuscript.

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Table 1: Sample characteristics

Patient level	Intervention group (n=301)	Control group (n=213)	P-value*
Age			0.701
Mean age (years) $\pm$ SD	81.38 $\pm$ 7.54	81.19 $\pm$ 7.06	
Min-max	65-99	65-103	
Older $\geq$ 80 years	192/294 (65.3%)	133/209 (63.6%)	
Female, n (%)	227 (76.9%)	168 (80.4%)	0.381
Unknown	6	4	
CCI $\pm$ SD	2.96 $\pm$ 0.19	2.98 $\pm$ 0.15	0.445
Dementia, n (%)	12 (4.7%)	5 (2.8%)	0.452
Unknown	44	36	
ASA			0.071
ASA 1, n (%)	26 (16.6%)	21 (10.2%)	
ASA 2, n (%)	76 (48.4%)	92 (44.7%)	
ASA 3, n (%)	55 (35.0%)	93 (45.1%)	
Unknown	144	7	
Fracture type			0.520
Intracapsular, n (%)	141 (48.6%)	104 (52.0%)	
Extracapsular, n (%)	149 (51.4%)	96 (48.0%)	
Unknown	11	13	
Displaced			0.280
Displaced fracture, n (%)	207 (73.1%)	146 (77.7%)	
Non-displaced fracture, n (%)	76 (26.9%)	42 (22.3%)	
Unknown	18	25	
Type of surgery			0.640
Fixation, n (%)	163 (55.6%)	101 (53.2%)	
Arthroplasty, n (%)	130 (44.4%)	89 (46.8%)	
Unknown	8	23	
ADL before fracture			0.880
Independent, n (%)	163 (59.7%)	121 (59.0%)	
Help needed, n (%)	110 (40.3%)	84 (41.0%)	
Unknown	28	8	
Mobility status before fracture			0.837
Walking without help, n (%)	177 (69.1%)	131 (68.2%)	
Walking with help, n (%)	70 (27.3%)	48 (25.0%)	
Wheelchair/bedridden, n (%)	9 (3.5%)	13 (6.8%)	
Unknown	45	21	
Prefracture residence			0.811
Home, n (%)	221 (81.5%)	173 (82.8%)	
Different home, n (%)	50 (18.5%)	36 (17.2%)	
Unknown	30	14	
Hospital level	Intervention group (n=15)	Control group (n=11)	P-value*

Teaching status, n	5 (33.3%)	4 (36.4%)	0.873
>600 beds, n	3 (20.0%)	2 (18.2%)	0.907
>300 patients admitted with PFF each year, n	3 (20.0%)	2 (18.2%)	0.907
Disciplines which are real member of the team	Intervention team (n=15)	Control team (n=11)	P-value*
Surgeons (orthopedic or trauma)	15 (100%)	11 (100%)	
Rehabilitation physicians	2 (13.3%)	1 (9.1%)	0.735
Geriatric physicians	2 (13.3%)	1 (9.1%)	0.735
Physician anesthesiologists	0 (0.0%)	1 (9.1%)	0.183
Nurses	15 (100%)	11 (100%)	
Physiotherapists	12 (80.0%)	9 (81.8%)	0.907
Social workers	11 (73.3%)	9 (81.8%)	0.609
Occupational therapists	4 (26.7%)	3 (27.3%)	0.973
Dietician	4 (26.7%)	1 (9.1%)	0.244
Speech therapists	1 (6.7%)	0 (0.0%)	0.288

Abbreviations: ADL, Activities of Daily Living; ASA, American Society of Anesthesiologists Physical Status classification; CCI, Charlson Comorbidity Index; SD, standard deviation.

Notes: *Chi-square test, Mann-Whitney U-test and independent samples t-test for categorical, ordinal and continuous variables respectively.

Table 2: Unadjusted and adjusted patient outcomes and adherence to guidelines (intervention and control group)

	Intervention group	Control group	Difference unadjusted		Difference adjusted*	
			OR (95% CI)	P-value	OR (95% CI)	P-value
6-month mortality	27/229 (11.8%)	9/133 (6.8%)	1.842 (0.838 – 4.045)	0.128	1.819 (0.811 – 4.081)	0.146
30-day mortality	16/234 (6.8%)	3/145 (2.1%)	3.488 (3.446 – 3.530)	<0.001	3.519 (0.983 – 12.592)	0.053
30-day readmission	13/206 (6.3%)	4/139 (2.9%)	1.807 (0.232 – 14.059)	0.572	1.676 (0.214 – 13.145)	0.623
6-month readmission	21/178 (11.8%)	5/118 (4.2%)	2.351 (0.411 – 13.449)	0.337	2.271 (0.404 – 12.775)	0.352
Length of stay	12.35±7.82	14.65±6.94	0.140 (0.009 – 2.141)	0.158	0.122 (0.008 – 1.861)	0.131
Functional status (ADL-score) 30-day after discharge same as before fracture	70/90 (77.8%)	60/73 (82.2%)	0.734 (0.223 – 2.347)	0.602	0.688 (0.198 – 2.394)	0.556
Functional status (ADL-score) 6-month after discharge same as before fracture	72/83 (86.7%)	64/77 (83.1%)	1.330 (0.557 – 3.176)	0.521	1.413 (0.577 – 3.463)	0.450
Mobility status 30-day after discharge same as before fracture	61/132 (46.2%)	37/107 (34.6%)	1.625 (0.962 – 2.748)	0.070	1.600 (0.943 – 2.717)	0.082
Mobility status 6-month after discharge same as before fracture	62/121 (51.2%)	54/99 (54.5%)	0.876 (0.514 – 1.492)	0.625	0.866 (0.506 – 1.482)	0.599
Proportion of patients returning to previous residential status 30-day after discharge	119/160 (74.4%)	98/126 (77.8%)	0.780 (0.317 – 1.919)	0.589	0.900 (0.299 – 2.709)	0.851
Proportion of patients returning to previous residential status 6-month after discharge	122/150 (81.3%)	95/117 (81.2%)	1.009 (0.543 – 1.875)	0.977	1.065 (0.543 – 2.091)	0.854
EQ5D (measured 30-day after discharge)	0.425±0.321	0.409±0.306	1.006 (0.910 – 1.111)	0.911	1.000 (0.907 – 1.104)	0.993
SF36 (measured 30-day after discharge)						
Physical functioning	20.61±23.91	19.06±24.97	1.528 (3.299) +	0.644	-0.977 (2.895) +	0.938
Social functioning	41.69±26.56	41.51±27.22	-4.893 (5.552) +	0.379	-4.390 (4.265) +	0.619
Role physical	10.74±25.26	15.36±30.86	0.398 (4.424) +	0.928	2.167 (4.884) +	0.781
Role emotional	37.09±47.49	34.88±45.99	0.708 (3.373) +	0.834	-0.625 (3.357) +	0.720
Mental health	60.92±22.36	59.62±18.70	2.596 (4.103) +	0.527	2.805 (4.760) +	0.594
Vitality	49.24±24.26	46.05±20.63	-0.298 (3.670) +	0.936	-0.586 (3.631) +	0.982
Bodily pain	48.96±23.41	46.98±26.08	1.795 (10.216) +	0.860	6.694 (10.637) +	0.506
General health	49.21±22.07	49.11±19.34	1.209 (3.702) +	0.744	0.316 (4.170) +	0.998
Health change	30.23±21.26	30.97±21.28	-0.315 (2.997) +	0.916	-0.051 (3.188) +	0.989

*Adjusted for age, gender, type of fracture and Charlson comorbidity index
n/N (%) or mean±SD, + Beta-coefficient (Standard error), bold: significant $P<0.05$

Table 3: Unadjusted results adherence to guidelines (intervention and control group)

Process indicators	Intervention group (n=301)	Control group (n=213)	P - value	Intervention-control
Preoperative management	70.54±22.85*	56.42±22.67*	0.036	
1. Performance of adequate analgesia preoperatively	263/301 (87.4%)	185/213 (86.9%)	0.761	+0.5%
2. Assessment of prefracture mobility status	267/301 (88.7%)	71/213 (33.3%)	<0.001	+55.4%
3. Performance of X-ray of affected hip	230/301 (76.4%)	136/213 (63.8%)	0.395	+12.6%
4. Preoperative assessment of cognitive status	252/301 (83.7%)	158/213 (74.2%)	0.989	+9.5%
5. Performance of adequate pain assessment	148/301 (49.2%)	115/213 (54.0%)	0.716	-4.8%
6. Assessment of prefracture falls	113/301 (37.5%)	55/213 (25.8%)	0.276	+11.7%
7. Preoperative assessment of hemoglobin	280/301 (93.0%)	196/213 (92.0%)	0.611	+1.0%
Perioperative management	60.24±26.58*	52.90±21.19*	0.216	
8. Performance of adequate antibiotic prophylaxis	102/301 (33.9%)	68/213 (31.9%)	0.710	+2.0%
9. Performance of surgery within 24 hours after admission	162/301 (53.8%)	73/213 (34.3%)	0.051	+19.5%
Postoperative management	36.69±14.72*	34.28±12.65*	0.762	
10. Adequate administration of analgesia postoperatively	292/301 (97.0%)	201/213 (94.4%)	0.196	+2.6%
11. Performance of pressure ulcers risk management	242/301 (80.4%)	157/213 (73.7%)	0.524	+6.7%
12. Performance of active mobilization within 24-48 hours in patients who can walk before fracture	165/261 (63.2%)	110/199 (55.3%)	0.705	+7.9%
13. Assessment of pressure ulcers risk	152/301 (50.5%)	94/213 (44.1%)	0.742	+6.4%
14. Performance of antithrombotic prophylaxis	88/301 (29.2%)	54/213 (25.4%)	0.786	+3.8%
15. Assessment of cognitive status at start of mobilization	55/301 (18.3%)	26/213 (12.2%)	0.797	+6.1%
16. Adequate pain assessment postoperatively	49/301 (16.3%)	20/213 (9.4%)	<0.001	+6.9%
17. Referral to osteoporosis clinic	35/268 (13.1%)	31/190 (16.3%)	0.710	-3.3%
18. Assessment of postoperative nutritional status	32/301 (10.6%)	0/213 (0.0%)	0.999	+10.6%
19. Referral to geriatric clinic in patients >75 years	20/206 (9.7%)	16/147 (10.9%)	0.403	-1.2%
20. Assessment of fluid balance	25/301 (8.3%)	21/213 (9.9%)	0.876	-1.6%
21. Performance of hospital visit by social worker during hospitalization	47/301 (15.6%)	50/213 (23.5%)	0.364	-7.9%
22. Discharge letter with information about home medication	136/301 (45.0%)	96/213 (45.1%)	0.860	-0.1%
23. Oral explanation of home medication	126/301 (47.0%)	100/213 (46.9%)	0.558	+0.1%
24. Extra support arranged in patients who need more support when going home	70/166 (42.2%)	52/144 (36.1%)	0.526	+6.1%
Not-recommended care				
1. Preoperative traction	78/301 (25.9%)	105/213 (49.3%)	0.069	-23.4%
2. Surgical wound drain	121/301 (40.2%)	98/213 (46.0%)	0.327	-5.8%
3. Urine catheterization	210/301 (69.8%)	135/213 (63.4%)	0.287	+6.4%

* Mean± SD, n/N (%), bold: significant $P<0.005$