

Room for improvement in the treatment of hip fractures in Denmark

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ABSTRACT

INTRODUCTION: Treatment of hip fractures has evolved since the introduction of fast-track surgical programs in the late 1990s. The aim of our study was to describe the quality of treatment and care related to fast-track hip fracture surgery in Denmark by external audit of patient records.

MATERIAL AND METHODS: This was a national multicenter audit of hospital charts from each hospital treating ≥ 50 hip fracture patients per year ($n = 594$).

RESULTS: The study demonstrated significant variability in treatment and care of patients with hip fractures among the regions of Denmark. Pain management, nutritional screening, ambulation characteristics, training in activities of daily living, and rehabilitation planning were consistently inadequate. Length of stay was 7-11 days.

CONCLUSIONS: Although the principles for fast-track surgery have been adapted to some extent at all departments in Denmark with an annual treatment of at least 50 patients with hip fractures, no single department has implemented the whole package. Hospital stay has been reduced since the introduction of fast-track regimes, and improvements were seen in many of the quality indicators. Implications for future practice include better adherence to clinical guidelines, a more homogeneous documentation system in nursing, promotion of evidence-based standards, and improved treatment and care of the physical and psychological consequences of hospitalization.

The incidence of hip fractures in Denmark is about 10,000 per year. The mean age is 80 years and 75% of those affected are women. Hospitalization is associated with high co-morbidity and risk of medical complications [1, 2]. The estimated financial costs range in the order of 2% of the total number of hospital days at Danish hospitals in 2003 [3]. In addition, there are long-term expenses related to treatment of complications, rehabilitation, home care and care homes.

International guidelines for the management of hip fractures exist and are continuously being updated as new evidence becomes available [4]. Yet, national audits demonstrate wide variations in the management of hip fractures for lack of evidence on which to base best practice guidance [5]. Several initiatives have been taken in Denmark to assess current practice and to promote

the quality of treatment and care of patients with hip fractures. National guidelines for conventional treatment of hip fractures were established in 1999 and revised in 2008 [6]. The National Indicator Project (NIP), in the context of which various treatments are defined and assessed, was initiated in 2001. The NIP assessed treatment of hip fractures based on self-reported data in 2005-2009 [7].

A guideline for a fast-track surgical program for patients with hip fractures became available in 2005 [8]. The main treatment and care categories in fast-track programs have been described as: information, reduction of surgical stress, multimodal opioid-sparing pain management, early mobilization and adequate nutrition [9]. In 2004 the Unit for Perioperative Nursing (EPS) was established to promote the implementation of fast-track programs in Denmark [8]. The unit has been instrumental in the establishment of national clinical practice guidelines (CPG) for fast-track regimes. The main objective was to standardize clinical practice and reduce variability by focusing on evidence-based outcomes. So far, clinical practice guidelines have been written for 16 surgical fast-track programs. After the provision of guidelines, there has been a need for a national audit to assess these programs [10]. The aim of our study was to describe the quality of treatment and care related to fast-track hip fracture surgery in Denmark by external audit of patient records.

MATERIAL AND METHODS

Our study was a national multicenter audit of hospital charts. The design was descriptive and comparative. Each department in Denmark providing surgical treatment for hip fractures was assessed with regard to their use of

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ABBREVIATIONS

ADL = activities of daily living (activity)
CAM = Confusion Assessment Method (delirium)
CAS = cumulated ambulation score (activity)
COX-2 = COX-2 inhibitors (pain medication)
MDAS = Memorial Delirium Assessment Scale (delirium)
NSAID = non-steroidal anti-inflammatory drug (pain medication)
PRN = when necessary (pro re nata)
VAS = visual analog scale (pain)

TABLE 1

Distribution of patients and hospitals audited in the regions of Denmark.

| | Capital n (%) | Zealand n (%) | Northern n (%) | Central n (%) | Southern n (%) | Total n (%) |
|---------------------------|------------------|------------------|-------------------|------------------|-------------------|----------------|
| Number of patients/charts | 135 (23) | 99 (17) | 80 (13) | 140 (24) | 140 (24) | 594 (100) |
| Number of hospitals | 7 | 5 | 4 | 7 | 7 | 30 |

clinical guidelines and the degree of adherence to selected indicators related to surgery and postoperative recovery [9]. We did not investigate the quality of the guidelines in use. The charts were audited by nurses designated as fast-track implementation agents at hospitals in each of the five organizational regions of Denmark.

Data generation

The audit was conducted from August 2007 to January 2008. The included patients had the following diagnostic admission codes: S72.0, S72.1, and S72.2. In 2007, a total of 10 117 patients with these codes were recorded in the Danish Patient Registry (Landspatientregistret, LPR). Patient records from each hospital treating ≥ 50 hip fracture patients per year were included.

The organizational framework integrated categories of treatment and care from three perspectives. The main focus was on the five categories described in the

fast-track regime: Information, anaesthesia, pain management, mobilization, and nutrition. In addition, we looked at the care categories identified by the Department of Health for general nursing care: Activity (activities of daily living, ADL), knowledge and development (patient and family information), nutrition, elimination, pain, psychosocial issues, sleep and rest (delirium prevention). Finally, we looked at categories related to the chronology of hospitalization and postoperative recovery: admission, surgery, discharge and rehabilitation. Physicians' and nurses' notes in the hospital charts of 20 consecutive hip fracture patients were audited at 30 hospitals, yielding assessment of 594 patient trajectories, **Table 1**. Six charts were excluded due to incomplete information. The quality of the audit process was improved by explicit definition of each indicator and by having the auditors review several hospital charts together to ensure consistency.

Data analysis

Data were calculated using SPSS version 17. Descriptive statistics were performed to illustrate the percentage of charts that documented treatment and care in each category. Data were analyzed according to the organizational regions of Denmark. Statistically significant inter-regional variations were calculated using χ^2 test, and $p < 0.05$ was considered significant.

TABLE 2

Chronological distribution of fast-track indicators by regions of Denmark.

| | Capital n (%) | Zealand n (%) | Northern n (%) | Central n (%) | Southern n (%) | Total | χ^2 p-value |
|--|------------------|------------------|-------------------|------------------|-------------------|----------|---------------------|
| Pain: regional management | 87 (64) | 51 (53) | 30 (38) | 71 (51) | 57 (42) | 296 (50) | 0.000 |
| Preoperative function assessment | 59 (44) | 63 (64) | 33 (41) | 120 (100) | 114 (82) | 389 (68) | 0.000 |
| Nutrition: preoperative screen | 79 (59) | 65 (69) | 54 (68) | 102 (73) | 100 (73) | 400 (68) | 0.077 |
| Nutrition: regular diet | 83 (62) | 69 (74) | 62 (79) | 102 (76) | 66 (49) | 382 (66) | 0.000 |
| Nutrition: systematic assessment | 38 (28) | 15 (16) | 44 (56) | 56 (41) | 45 (33) | 198 (34) | 0.000 |
| Information: written | 50 (37) | 36 (38) | 51 (64) | 139 (99) | 24 (17) | 300 (51) | 0.000 |
| Information: video | 6 (4) | 0 | 0 | 0 | 0 | 6 (1) | 0.000 |
| Family: involvement in care | 108 (81) | 72 (77) | 64 (82) | 111 (80) | 111 (80) | 466 (80) | 0.920 |
| Pain: continuous epidural | 33 (25) | 2 (2) | 0 | 1 (1) | 5 (4) | 41 (7) | – |
| Pain: local anaesthesia | 0 | 6 (6) | 5 (6) | 16 (12) | 6 (4) | 33 (6) | 0.001 |
| Pain: cont. regional block | 25 (19) | 7 (7) | 25 (31) | 15 (12) | 19 (14) | 91 (16) | 0.000 |
| Pain: oral COX2 inhibitor or acetaminophen | 76 (57) | 3 (3) | 13 (16) | 6 (5) | 29 (21) | 127 (22) | 0.000 |
| Pain: regular opioid treatment | 100 (75) | 91 (94) | 71 (89) | 124 (96) | 132 (97) | 518 (90) | 0.000 |
| Pain: regular acetaminophen | 132 (100) | 91 (94) | 79 (99) | 124 (98) | 135 (99) | 561 (98) | 0.010 |
| Pain: VAS-assessment | 69 (51) | 33 (34) | 15 (19) | 42 (30) | 3 (2) | 162 (28) | 0.000 |
| Mobilization: use CAS | 20 (15) | 40 (41) | 40 (50) | 0 | 0 | 100 (17) | 0.000 |
| Postoperative function assessment | 76 (66) | 53 (58) | 64 (80) | 111 (80) | 108 (79) | 412 (73) | 0.000 |
| Function: ADL-training | 50 (37) | 48 (51) | 33 (42) | 59 (45) | 57 (43) | 247 (43) | 0.325 |
| Function: ADL-schedule | 57 (42) | 50 (53) | 29 (37) | 0 | 49 (35) | 185 (32) | 0.000 |
| Discharge: criteria used | 94 (72) | 13 (16) | 75 (100) | 132 (98) | 79 (59) | 393 (71) | 0.000 |
| Discharge: regular patient meeting | 95 (70) | 32 (34) | 74 (94) | 74 (62) | 98 (73) | 373 (66) | 0.000 |
| Discharge: regular family meeting | 97 (72) | 50 (53) | 58 (74) | 74 (62) | 111 (81) | 390 (69) | 0.000 |
| Discharge: plan for rehab. | 94 (70) | 64 (67) | 39 (70) | 116 (85) | 100 (73) | 413 (74) | 0.013 |

See the box for abbreviations.

Ethical considerations

Local management at each department consented to the audit. All patients were anonymous, no personal data were used in the study and approval from the ethics committees in Denmark was not required.

RESULTS

General data

All 30 orthopaedic departments in Denmark reported using clinical guidelines for patients with hip fractures. The median age of the patients was 83 years (range 39-103). Females accounted for 72% of the population.

Admission (preoperative indicators)

The median period from admission to surgery was 22 hours (25th-75th percentiles: 15-33). Regional anaesthetic pain techniques were used in 50% (interregional range 38-64%), **Table 2**.

Anaesthesia (intraoperative indicators)

Regional anaesthesia was used in 64% of patients, predominantly in Western Denmark, while general anaesthesia was used in 37% of patients, mostly in Eastern Denmark.

Pain management (postoperative indicators)

Only 28% (interregional range 2-51%) of the patients audited were assessed for pain on a visual analogue scale (VAS), **Table 2**. Most departments used opioids and acetaminophen postoperatively, **Figure 1**. Oral COX-2 inhibitors and nonsteroidal anti-inflammatory drugs (NSAIDs) were only used in 20%. The use of continuous epidural analgesia, peripheral nerve blocks and local wound anaesthesia was rare.

Patient and family information

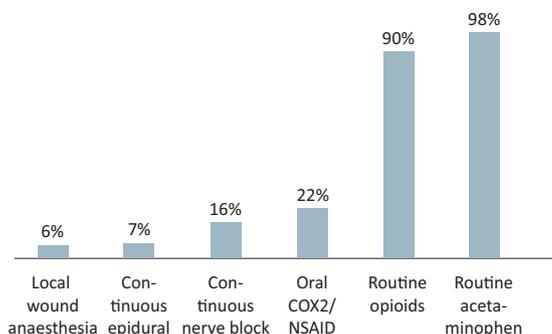
Half of the patients in the study received written information, while only 1% was informed by video, **Table 1**. Family participation occurred in 80% of the cases during admission and in 69% during discharge.

Mobilization, physical activity and activities of daily living-training

Preoperative functional assessment was performed in 68% of the cases. In 76%, the first mobilization out-of-bed was on the day of surgery or the next day. In 22%, the first day out of bed was on the second to fourth day; 2% were first mobilized later than four days after surgery (the reason for the delay was not recorded). Postoperative functional assessment was performed in 73% of the cases, while rehabilitation was planned in 74%. ADL training was integrated in nursing-care related to personal hygiene in only 43% of cases, and the cumulated ambulation score (CAS) was used to assess inde-

FIGURE 1

Pain management. See the box for abbreviations.



pendent walking function and predict short-term outcome in a mere 17% of patients.

Nutrition and elimination

Preoperative nutritional screening was performed in 68% of the patients, and a regular diet was resumed the day after surgery in 66%, **Table 2**. Systematic nutritional assessment was performed in only 34%, whereas constipation prevention occurred in 85%, **Table 3**.

Delirium screening, prevention and treatment

Only 28% of the patients were routinely assessed for delirium, using the Confusion Assessment Method (CAM), while 13% were assessed only when necessary. The Memorial Delirium Assessment Scale (MDAS) was rarely used. Delirium prevention by sleeping medication was initiated in 19%, whereas delirium treatment occurred in 40%, **Table 3**.

Discharge, length of stay and mortality

Discharge criteria were used systematically in 71% of the patients. The median hospital stay was nine days (interregional range 7-11 days): 64% were discharged to their home, 17% were discharged to rehabilitation, 3% were admitted to a care home, 2% had home care, 1% were discharged to family members, 8% to hospital and 5% died in hospital during the primary admission.

DISCUSSION

The demographic profile of our study matched other national and international studies [5, 7]. Significant variability in the treatment and care among the regions of the country was demonstrated. Pain management, nutritional assessment, ambulation characteristics and ADL training were consistently inadequate [11]. In the following, we discuss our findings in relation to the recommendations in the evidence-based guideline for fast-track hip fracture care [8].

 TABLE 3

Distribution of general nursing indicators by regions of Denmark.

| | Capital n (%) | Zealand n (%) | Northern n (%) | Central n (%) | Southern n (%) | Total | χ^2 p-value |
|--|------------------|------------------|-------------------|------------------|-------------------|----------|---------------------|
| Abdominal: prevention of constipation | 113 (84) | 79 (81) | 64 (81) | 113 (81) | 130 (96) | 499 (85) | 0.003 |
| Respiratory: oxygen treatment | 96 (73) | 46 (57) | 45 (61) | 31 (23) | 31 (23) | 249 (45) | 0.000 |
| Physical: preop. assessment of pressure ulcers | 77 (59) | 55 (68) | 38 (51) | 43 (33) | 48 (36) | 261 (47) | 0.000 |
| Physical: assessment daily pressure ulcers | 73 (56) | 36 (44) | 32 (43) | 35 (26) | 30 (22) | 206 (37) | 0.000 |
| Delirium: assessment by regular CAM | 94 (72) | 0 | 0 | 0 | 57 (42) | 151 (28) | 0.000 |
| Delirium: assessment by PRN CAM | 30 (23) | 0 | 17 (23) | 0 | 20 (15) | 67 (13) | 0.000 |
| Delirium: assessment by regular MDAS | 19 (15) | 0 | 0 | 0 | 0 | 19 (4) | 0.000 |
| Delirium: assessment by PRN MDAS | 2 (2) | 0 | 0 | 0 | 0 | 2 (<1) | 0.000 |
| Delirium: prevention | 42 (32) | 6 (13) | 0 | 32 (27) | 15 (11) | 95 (19) | 0.000 |
| Delirium: treatment | 75 (57) | 14 (30) | 1 (1) | 20 (15) | 97 (72) | 207 (40) | 0.000 |

See the box for abbreviations.

Our study demonstrated that pain was managed on admission by regional nerve block in half of the patients, and that the median delay before surgery was 22 hours. The guideline for fast-track surgery recommends surgery within 24 hours of admission, which shows satisfactory quality in relation to this indicator. Acute pain, however, requires better management to reduce the risk of physiological and psychological complications and to avoid opioid-related side effects [1, 12, 13].

Significant variation in the choice of anaesthesia was seen in our study, with two thirds using spinal and one third using general anaesthesia. Although spinal anaesthesia cannot be applied in all patients, it is recommended for minimizing the risk of postoperative complications [14-16]. Regular pain assessment by VAS was performed in only 28% of patients, suggesting inad-

equately adherence to evidence-based standards. Opioids and acetaminophen were the preferred agents, while nerve block, epidural anaesthesia and oral COX-2 inhibitors/NSAIDs were rarely administered. The fast-track regime discourages the use of opioids due to symptoms such as nausea, vomiting, lethargy and constipation [12]. Although there is evidence that COX-2 inhibitors and NSAIDs are safe in short-term use [1], most departments did not administer these drugs.

Two thirds of the patients had preoperative nutritional assessment, whereas only 34% followed up on such efforts during hospitalization. This is an area of care requiring more attention as adequate nutrition is one of the mainstays of fast-track regimes [11]. Early mobilization and ADL training enable patients to regain independence after discharge. The goal is to continue training beyond the hospital stay to maintain function and independence. Functional ADL training was provided in 43%, and CAS in only 17%, which is inadequate to ensure optimal post-discharge functioning [17].

Patients experiencing delirium may have psychological problems during hospitalization and after discharge. A prerequisite for mobilization and training are that the patients are awake, oriented and cooperative. Untreated pain may possibly precipitate delirium, whereas opioids may also cause delirium [18]. The national guideline for treatment of hip fractures recommends delirium assessment by CAM and MDAS, but our study demonstrated low adherence to these recommendations. This area needs improvement, because delirium is distressing to the patient as well as to the family and health care professionals.

Only 71% of the departments used discharge criteria, despite the importance of ensuring the same level of recovery in fast-track and conventional regimes. Concern that patients may be discharged prematurely has been a barrier for some nurses preventing them from becoming committed to fast-track surgery pro-



Patient after hip surgery.
Photo by Kirsten Specht.

grams [19]. Only 74% had a rehabilitation plan at discharge. The main objective for postoperative mobilization is to prevent complications and maintain usual functional level [17, 20]. Although preoperative functional assessment facilitates goal-oriented training, this was only performed in two thirds of the sample. Most patients, however, were mobilized on the day of surgery or the day after and had a postoperative functional assessment performed. It is recommended in the fast-track guideline that training continue after discharge and the goal is for the patient to regain the pre-fracture level of functioning.

Length of stay was 10-19 days in 2000 with conventional regimes [18]. In our study this was reduced to 7-11 days, which may be a result of the introduction of fast-track regimes. Some surgical departments collaborate with rehabilitation centres, easing the transit from hospital to discharge.

The inherent limitation of an audit is inaccurate charting in patient records, which calls for a more homogeneous charting system in nursing to increase the quality of audits. Another potential limitation is inter-rater variability during the audit. In our study, we initially paired the auditors to ensure consistency, and we had the auditors assess charts from each other's units to prevent home department bias. Each item was defined by the group performing the audit to ensure agreement and consistency. The relatively large sample and the representative patient demographics increased the internal and external validity of our study.

CONCLUSION

Although the principles for fast-track surgery have been adapted to some extent at all departments providing hip surgery in Denmark, no single department has implemented the whole package. Better adherence to the regime is required to test the full benefit of the programs. Hospital stay has been reduced since the introduction of fast-track regimes, and improvements were seen in many of the quality indicators. Most patients were surgically treated within 24 hours as recommended. Pain management, nutritional assessment, ambulation characteristics, and training in activities of daily living, however, did not adequately follow evidence-based standards. Implications for future practice include better adherence to clinical guidelines, a more homogeneous documentation system in nursing, promotion of evidence-based standards, and improved treatment and care of physical and psychological consequences of hospitalization.

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CONFLICTS OF INTEREST: None

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