Protocol-guided hip fracture management reduces length of hospital stay

Objective: To see if protocolised hip fracture care led to an improvement in patient management and more standardized treatment with the aim of reducing wait for surgery and postoperative length of stay.

Design: Following the introduction and establishment of a care pathway a retrospective, observational audit was conducted with patient data and pathway compliance obtained from analysing medical notes and accessing electronic patients' records.

Setting: The audit analysed all patients who sustained a fractured hip admitted to University College London Hospital over an 18-month period between August 2009 and February 2011.

Measurements: In addition to demographic data, a comparison was made between those who were and were not managed with the care pathway. Investigations, preoperative management, time to surgery, length of stay and mortality were all evaluated.

Results: Patients managed via the care pathway had significantly more investigations and preoperative interventions, and subsequently had a reduced length of hospital stay (a mean average of 13 compared to 17 days). There was no significant difference in time from admission to surgery, and 30-day mortality.

Conclusions: Using a care pathway to manage those patients sustaining fractured femur appears to make preoperative management more consistent. This, in turn, leads to a reduction in length of hospital stay.

As the elderly population is increasing, hip fractures have become a major public health issue. Approximately 75 000 hip fractures occur each year in the UK accounting for 1.5 million bed days, with a total cost of care exceeding £2 billion annually (National Institute for Health and Clinical Excellence, 2011a). Patients with a fractured hip have a median postoperative length of hospital stay of 23 days and a 30-day mortality of 8–10%, a figure that has failed to improve over the past 20 years (Griffiths et al, 2012).

The Department of Health requires that patients should be operated on within 24 hours of a decision being made that they are fit for surgery in order to reduce needless delay and risk of further morbidity. A target of 36 hours from admission to surgery was introduced to England and Wales in 2010 (National Hip Fracture Database, 2012). Siegmeth et al (2005) showed that delayed surgery of more than 48 hours from admission increases morbidity and increases 30-day postoperative mortality by 41%. It has also been shown that mortality is increased by 9.4% in patients over 65 years of age if surgery is delayed by over 24 hours (Bottle, 2006).

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National guidelines have been introduced to establish best standards of care. Initially these were from the Scottish Intercollegiate Guidelines Network (2009) and the British Orthopaedic Association (2007). Subsequently in June 2011 the National Institute for Health and Clinical Excellence (2011a) published guidelines on the management of hip fractures in adults. In addition, the Anaesthetic Association of Great Britain and Ireland produced guidance on the perioperative management of proximal femoral fractures (Griffiths et al, 2012).

The National Institute for Health and Clinical Excellence clinical guidelines' key priorities for implementation incorporate multiple medical facets from admission to discharge planning including timing of surgery and multidisciplinary care, emergency department care, surgical procedure, postoperative management and follow up. The Anaesthetic Association of Great Britain and Ireland guidelines (in addition to having multiple analogous stages to the National Institute for Health and Clinical Excellence guidelines) state that all hospitals should develop a specific protocol for the resuscitation of patients including intravenous fluids, analgesia, pressure care and monitoring (including electrocardiography).

Before the publication of the National Institute for Health and Clinical Excellence guidelines, based on Scottish Intercollegiate Guidelines Network and British Orthopaedic Association data, University College London Hospital introduced a care pathway into the accident and emergency department in 2008 (*Figure 1*). This involved use of the algorithm in *Figure 1* to standardize care for all patients admitted with a fractured neck of femur with the intention, as based on the research, to improve patient outcome by decreasing morbidity and mortality and reducing length of hospital stay.

The author audited the compliance with this care pathway to see whether use of the algorithm led to a reduction in time from admission to surgery. Secondary aims looked at outcome data and whether use of the algorithm led to a reduced length of hospital stay.

Methods

This retrospective audit was conducted over an 18-month period between August 2009 and February 2011 at University College London Hospital. The local audit committee approved the design of the study and, considering its observational nature, waived requirements for informed consent from the patients or further ethical approval. The study was powered to detect a difference in length of hospital stay with a 95% confidence level and with less than a 10% margin of error. It was not powered significantly to detect any difference in mortality.

Data collection was achieved by analysing the notes for all patients admitted between the stated dates with a fractured neck of femur. Presence of a completed care pathway along with its compliance, associated investigations and management options were also derived from the patients' medical notes. Outcome data (mortality and length of stay) were taken from discharge summaries and the electronic patients' record system.

Results were subsequently tabulated and underwent statistical analysis. The Chi-

squared test was used to compare some demographic data (gender and American Society of Anesthesiologists physical status classification), preoperative investigations, mortality and wait for surgery. Unpaired *t*-tests were used to analyse patients' age and length of hospital stay.

Results

Over the 18-month period, 146 patients with a fractured neck of femur were managed at University College London Hospital. Of these, 42 patients (29%) were managed with the pathway while 104 (71%) were not. There was no significant difference in the demographics and patients' preoperative fitness (as measured by the American Society of Anesthesiologists physical classification system) between those who were managed via the algorithm and those who were not (*Table 1*).

As shown in *Table 1*, patients were investigated in more depth when managed with the algorithm. Significantly more patients received an electrocardiogram (either documented or found in the notes on data collection), chest X-ray, had pressure care assessment and a preoperative orthogeriatric review. A similar proportion of patients received prompt intravenous fluids and analgesia in each group.

Although not significant, patients were operated on more quickly (more within 48 hours) if their care was guided by the algorithm (*Table 2*), and 30-day mortality was lower in these patients (7% compared to 12%) but this was not significant. However, reduction in length of stay was significant, with those patients managed by the algorithm having a shorter duration of hospital stay (13 compared to 17 days, $P<0.01$).

Discussion

This audit has shown that patient care was much more standardized (as aspired to in national guidelines) when following a care pathway. More patients in this group received appropriate investigations and, possibly most importantly, underwent management involving an orthogeriatrician. However, despite this improved care, there was no significant improvement in time from hospital admission to time of surgery which may reflect better preoperative preparation, but will need further

Figure 1. University College London Hospital algorithm for fractured neck of femur management. AMT = abbreviated mental test; CXR = chest X-ray; DMR = duty medical registrar; DVT = deep vein thrombosis; ECG = electrocardiography; ED = emergency department; FBC = full blood count; HDU = high dependency unit; IV = intravenous; (#) NOF = (fractured) neck of femur; RTA = road traffic accident; U&E = urea and electrolytes.

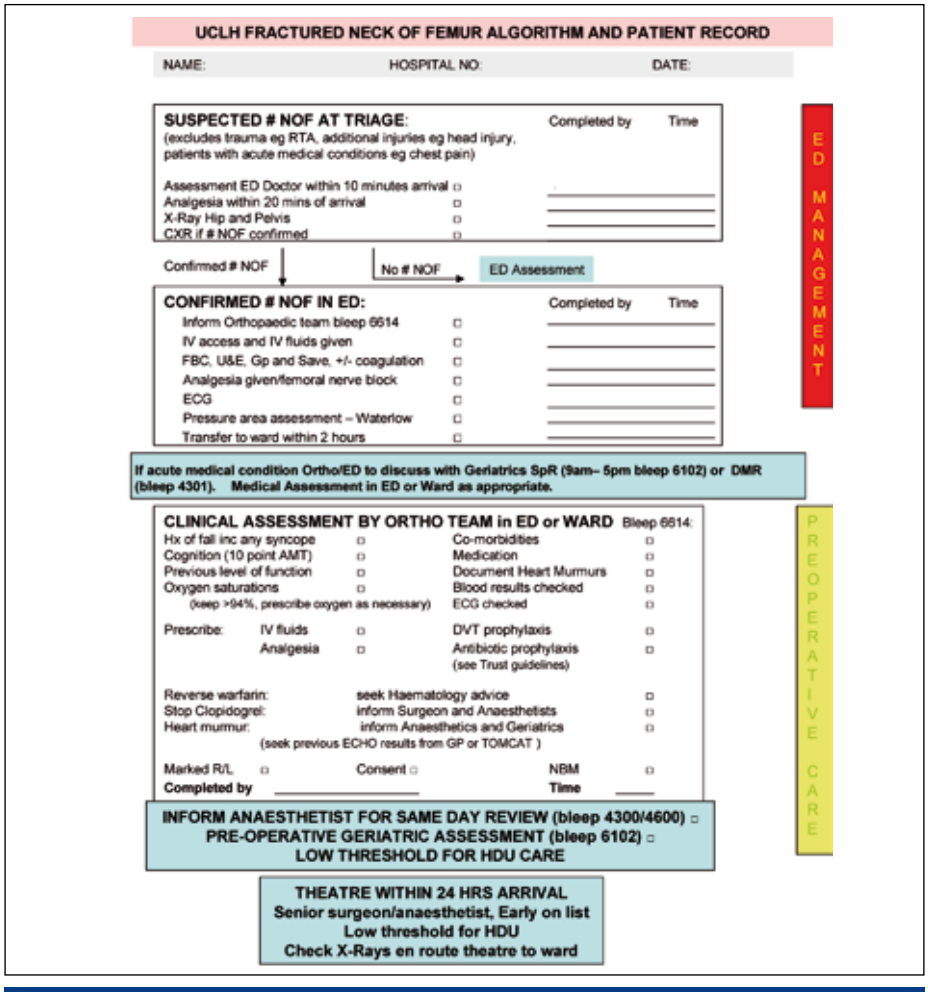

Table 1. Demographic data and preoperative care

		Algorithm (n=42)	No algorithm (n=104)	P value
Age, mean (standard deviation) (years)		78 (10)	76 (11)	0.56
Sex, n (%) male		11 (26)	25 (24)	0.83
American Society of Anesthesiologists (ASA) physical status n (%)				0.58
	ASA 1	7 (17)	16 (15)	
	ASA 2	17 (40)	40 (38)	
	ASA 3	16 (38)	43 (41)	
	ASA 4	2 (5)	5 (4)	
Preoperative care and investigations n (%)	Electrocardiography	40 (95)	74 (71)	<0.001
	Chest X-ray	36 (86)	31 (30)	<0.001
	Analgesia in accident and emergency	36 (86)	94 (90)	0.40
	Pressure care assessment	21 (50)	4 (4)	<0.001
	Intravenous fluids (within 6 hours)	32 (76)	76 (73)	0.43
	Preoperative orthogeriatric review	29 (69)	18 (17)	<0.001

Table 2. Outcome data

		Algorithm (*n*=42)	No algorithm (*n*=104)	*P* value
Wait for surgery, n (%)				0.66
	<24 hours	8 (19%)	22 (21%)	
	24–48 hours	26 (62%)	56 (54%)	
	>48 hours	8 (19%)	26 (25%)	
30-day mortality, n (%)		3 (7%)	9 (9%)	0.52
Length of stay in days, mean (standard deviation)		13 (4)	17 (6)	<0.01

review. This better preparation may be an explanation for the fact that, most noteworthy of all from the audit, patients whose care was managed by following the care pathway had a significantly shorter hospital stay. This audit showed that this appeared to confer no survival benefit in this group, but this may be disproved with larger studies as this audit was underpowered because it had an insufficient sample size to show this.

From this audit it is possible to infer that perioperative management following the University College London Hospital protocol improved patients' care and therefore they were discharged from hospital sooner. This average reduction in hospital stay of 4 days translates to a cost saving of £900 per patient (NHS Institute for Innovation and Improvement, 2008). What is surprising is that, given this enhanced management, surgery is not performed significantly sooner. The reason for this may be logistical (and not medical), with the majority of operations still occurring between 24 and 48 hours of admission. An alternative explanation may be that protocol-driven care means more orthogeriatric input, leading to more time to process the management and/or investigations, but this eventually leads to better outcomes.

As shown here, it may be difficult to see an improvement in mortality when assessing use of the pathway alone. Other proven interventions may need to be added to it to show any potential survival benefit, for example intraoperative cardiac output monitoring. National Institute for Health and Clinical Excellence (2011b) clinical guidance on CardioQ oesophageal Doppler monitoring states that this monitoring should be considered for use in patients undergoing major or high-risk surgery. It cites articles (Sinclair et al, 1997; Venn et al, 2002) showing a shorter length of stay in patients monitored with oesophageal Doppler who have suffered a hip fracture. Other interventions added may include the use of postoperative critical care (Scottish Intercollegiate Guidelines Network, 2009), or further input of a perioperative physician in addition to the orthogeriatric management.

One difficulty with the protocol is maintaining its compliance in a very busy accident and emergency department and hospital which has a rapid turnover of junior medical and other frontline staff. These are workers who have many other protocols and paperwork to contend with. This was evidenced by the fact that more algorithms were used in the first 6 months of the audit period (*n*=22) than in the final two 6-month periods (*n*=12 and 8). Ways to address and improve this take-up include better knowledge (e.g. posters in the accident and emergency department or education of guidelines during hospital trust induction), the involvement of enthusiastic senior orthopaedic surgeons, orthogeriatricians and accident and emergency physicians, or the involvement of patient safety champions. In addition, the appointment of trauma nurse specialists to coordinate the timely response in management may prove to be of benefit.

Given that this was a retrospective, observational study there are obvious limitations which could affect the results. Most notably, randomization was not possible and although there was no significant difference in the demographic data between the two groups there may be other confounding factors that contributed to the observed differences. From the notes, there was no obvious recognizable explanation, with date or time of admission, accident and emergency doctor or admitting orthopaedic consultant not having a bearing.

Another major discrepancy occurred when assessing analgesia received by patients in accident and emergency. This audit did not take into account pain scores at the time (e.g. less analgesia may have been given if the patient was not in pain), the type of analgesia received or whether pain relief was given pre-admission and/or by paramedics as this was deemed too complex for the audit. Therefore, little weighting can be given in this audit to analgesia received.

The findings of this audit support the National Institute for Health and Clinical Excellence (2011a) guidelines by showing that protocolised patient management is beneficial. Guidelines in general have been shown to be a constructive response to the reality of the challenges physicians face in assimilating and applying the expanding and often contradictory body of medical knowledge (Sniderman and Furberg, 2009). The National Institute for Health and Clinical Excellence and Anaesthetic Association of Great Britain and Ireland guidelines, in addition to the University College London Hospital algorithm, are more of a clinical pathway than a traditional guideline. By means of these care pathways and treatment protocols, a vast amount of routine care can be formulated, based on current evidence. This can help ensure a smooth treatment process, appropriate preoperative evaluation and investigations, and provide an invaluable opportunity to benchmark and improve quality of care for patients.

LEARNING POINTS

- Patients admitted with a traumatic hip fracture should be operated on the day of, or the day after, admission.
- National Institute for Health and Clinical Excellence guidelines exist for the perioperative and postoperative management of patients with a fractured hip.
- Protocol-guided hip fracture management leads to a reduction in hospital stay.

Conclusions

This audit demonstrates the value of protocolised care in the management of patients with hip fracture. The reduction in the length of hospital stay has been used as a surrogate for better care, but further work is required to support this encouraging early finding. **BJHM**

Conflict of interest: none.

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