The Best Practice Tariff helps improve management of neck of femur fractures: a completed audit loop

Background: The Best Practice Tariff incentivizes hospitals in the UK to improve the care they deliver, and includes a requirement to deliver multiprofessional care to patients with neck of femur fractures. The Best Practice Tariff for 2010–11 included six targets: (1) surgery within 36 hours, (2) admission under consultant-led joint orthopaedic–geriatric care, (3) admission using a multidisciplinary assessment protocol, (4) review by a geriatrician within 72 hours, (5) geriatrician-directed multi-professional rehabilitation, and (6) assessment for falls and bone protection. The authors chose to audit their Trust's compliance with these targets.

Methods: A retrospective audit was conducted in 2011 at the authors' university-affiliated tertiary care hospital, which is a regional major trauma centre. Only patients 65 years or older, with fragility-type neck of femur fractures who were treated surgically at the authors' unit and were eligible for geriatric review and multiprofessional rehabilitation, were included. The results of this audit (2010–11 Best Practice Tariff targets) were analysed and a series of procedural and logistical measures were introduced. A re-audit was performed in April 2012 for 2011–12, and the results for the 2 years were compared using appropriate statistics (Chi square tests and analysis of variance). Thirty-day mortality was compared using the summary hospital-level mortality indicator.

Results: A total of 410 patients were eligible for Best Practice Tariff in 2010–11, which increased to 463 in 2011–12. The changes from the first year's audit helped increase the rates for 36-hour surgery from 48.3% to 73.4% and for 72-hour geriatric review from 68.8% to 81.8% ($P<0.05$). The annual Best Practice Tariff achievement increased from 31.7% to 61.3% ($P<0.05$). The summary hospital-level mortality indicator declined from 96.5 to 61.3.

Conclusions: Focusing on poorly satisfied Best Practice Tariff indicators can produce a significant improvement in the per capita Best Practice Tariff achievement. Further studies are needed to assess the health and financial gain in detail.

The Department of Health introduced a Best Practice Tariff for the treatment of neck of femur fractures in April 2010 (Audit Commission, 2012). The financial 'incentive' was an incremental payment of £445 ('differential') over the base tariff for every neck of femur fracture treated, provided specified targets are achieved. These include:

1. Time to surgery within 36 hours from arrival in the accident and emergency department (or time of diagnosis if an inpatient) to the start of anaesthesia
2. Admission under the joint care of a consultant geriatrician and a consultant orthopaedic surgeon
3. Admission using a multidisciplinary assessment protocol agreed by geriatric medicine, orthopaedic surgery and anaesthesia
4. Perioperative assessment by a geriatrician within 72 hours of admission to the accident and emergency department
5. Geriatrician-directed multiprofessional rehabilitation
6. Fracture prevention assessments (falls and bone protection).

In 2011, the criteria were expanded to include two Abbreviated Mental Test scores (before and after surgery but within the same patient episode) (Audit Commission, 2012). The differential increased to £890 for 2011–12, and to £1335 in 2012–13; these have been achieved by lowering the base tariffs so that the level of Best Practice Tariff is the same.

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The authors' university-affiliated tertiary hospital serves as a regional major trauma centre in northern England and treats more than 400 neck of femur fractures annually. Joint care admission and the use of an 'integrated care pathway' were already firmly established in this hospital before the introduction of the Best Practice Tariff. The authors therefore chose to audit how the targets were met for time to surgery, and the geriatrician-related targets, i.e. clinical review, bone protection, falls assessment and multiprofessional rehabilitation in their patients. The results were followed up with a series of changes, and a re-audit was conducted 1 year later.

Methods

Approval to collect, store and retrospectively analyse data was obtained from the authors' institution for continuous audit after implementation of the Best Practice Tariff was started. Data for all neck of femur fracture patients admitted from 1 April 2010 were prospectively entered onto a database. These included patient identifiers, demographics, times of presentation to the accident and emergency department and of admission, surgery and discharge, frequency and timings of geriatric ward rounds, prescription of bone protection medication, discussion in multidisciplinary team meetings and referral for rehabilitation.

An audit was conducted in April 2011 for the previous 12 months. Exclusion criteria included those:

1. Younger than 65 years
2. With pathological (non-fragility) fractures
3. Treated surgically elsewhere but transferred to the unit for rehabilitation
4. Not eligible for multidisciplinary team rehabilitation.

Delays to surgery and to geriatrician review were calculated for all Best Practice Tariff-eligible patients. The results were discussed at departmental and multidisciplinary meetings.

A series of changes were then introduced in the initial few weeks of the second year

(*Table 1*). These included procedural and logistical initiatives, e.g. increasing dedicated trauma operating time, streamlining the existing neck of femur 'fast track' admission protocol, and expediting preoperative medical reviews and investigations. Orthogeriatric ward rounds started earlier and were more frequent to allow new admissions to be preferentially reviewed and optimized pre- and postoperatively. Patients with a fractured neck of femur were prioritized over other orthopaedic trauma cases. A re-audit of Best Practice Tariff targets was conducted in April 2012. This did not assess the Abbreviated Mental Test scores target, as there were no scores recorded in the first year. Descriptive statistics, e.g. percentage and mean (standard deviation), were used and variances were calculated for each target over the 12 months. An annual and monthly rate was calculated for each target and for the Best Practice Tariff:

Annual achievement rate = No of Best Practice Tariff satisfying episodes/Total no of Best Practice Tariff eligible episodes in 1 year

Monthly mean = No of Best Practice Tariff satisfying episodes/Total no of Best Practice Tariff eligible episodes in 1 month

Data on length of stay in hospital were calculated and 30-day mortality data were obtained from hospital and general practice records. GraphPad Prism Version 5.04 software (GraphPad Software, La Jolla, CA, USA) was used for statistical analysis. The defined Best Practice Tariff targets were treated as categorical variables and compared between the 2 years using Chi-squared tests. Analysis of variance (ANOVA) was used to compare the variances of the monthly means for the Best Practice Tariff targets. Length of stay was treated as a continuous variable and compared using a *t*-test. A *P* value of less than 0.05 was considered as statistically significant.

The Trust collects mortality data for all acute admissions; this is usually obtained as a record of summary hospital-level mortality indicator, published by the NHS Information Centre (Clinical Indicators Team, 2012). This indicator adjusts for some factors (age, gender, Charlson comorbidity score (Charlson et al, 1987) and admission method) and includes deaths in and out of hospital for 30 days following discharge after hospital treatment. Diagnosis-specific monthly summary hospital-level mortality indicators (with confidence intervals) were obtained and plotted against time for the 2 years.

Results

Table 2 compares achievement rates for all Best Practice Tariff targets between the 2 years. Out of 427 admissions, 410 patients (410 fractures) were Best Practice Tariff-eligible in the first year: 48.3% had surgery within 36 hours while 68.8% had geriatric review within 72 hours. The predominant reasons for surgical delay beyond 36 hours were administrative (60%), and patients being medically unfit (33%). Out of 475 admissions, 463 patients (463 fractures) were Best Practice Tariff-eligible in the second year. Following the change initiatives, the timely surgery and geriatric review targets improved to 73.4% (χ^2, $P<0.0001$) and 81.8% (χ^2, $P<0.0001$) respectively. The 36-hour surgery target showed the most variance over the study period (0.04 in year 1 and 0.02 in year 2), followed by the 72-hour geriatric review target (0.02 and 0.01 respectively). Both showed a trend towards consistency with the variances reducing in year 2 (ANOVA, $P<0.0001$ for both).

Table 3 compares summary hospital-level mortality indicator and length of stay for the 2 years. The summary hospital-level mortality indicator is below 100 (confidence interval = 70–97), but it does not show any significant difference between the years since the confidence intervals overlap. *Figure 1* shows the monthly summary hospital-level mortality indicator trend, suggesting a fall in summary hospital-level mortality indicator in the second year.

Table 1. Reasons for surgical and orthogeriatric review delays in year 1 and measures taken to address these in year 2

Category of delay		Reasons for delay	Examples where applicable	Steps taken
Surgical delays	'Organization' delays	Insufficient operating time in 7-day week	Ring-fenced trauma operating time	Increased from 45 to 65 hours
			Trauma list over-run	Minimizing 'turnover' time
			Other non-trauma surgical emergency	Parallel theatres opened to accommodate
	'Prioritization' delays	Non-neck of femur fracture trauma cases	Paediatric cases, hand trauma cases	Neck of femur fractures prioritized routinely
		Neck of femur fractures with special considerations	Concurrent orthopaedic (e.g. upper limb) injury requiring surgery	Improved liaison for both procedures to be done in same setting
	'Investigation' delays	Medical	Echocardiography	Neck of femur fracture echo requests prioritized
			Head injury	Head computed tomography scan routinely done during accident and emergency admission
		Surgical	Computed tomography or magnetic resonance imaging for inconclusive or pathological fractures	Imaging requests prioritized for neck of femur fractures over other inpatients
	'Optimization' delays	Treatment of acute life-threatening conditions		Earlier start for geriatrician ward rounds to review new admissions
		Optimization of subacute or chronic conditions		
Orthogeriatric review delays			Orthogeriatric ward rounds per week	Increased from 2 to 5
			Orthogeriatric consultant hours per week	Increased from 4 to 11

Discussion

In this audit loop, targeted interventions improved three targets for treatment of neck of femur fractures: 36-hour surgery, 72-hour geriatric review for patients and prescription of bone protection medication. The resulting Best Practice Tariff achievement rose significantly, but no significant improvements were observed in length of stay and 30-day mortality.

There is now a consensus on expediting surgery for hip fractures with the intention of improving outcomes (Khan et al, 2009; Simunovic et al, 2010). Guidelines from the Scottish Intercollegiate Guidelines Network (2009) and National Institute for Health and Care Excellence (2011) have helped address some of the issues contributing to surgical delay. Further reductions in surgical delay can be achieved by locally adapted solutions, as demonstrated by the results in the second year. The first audit identified administrative ('organization') and medical ('optimization') causes as the predominant reasons for surgical delay. Reductions in surgical delay were achieved by locally adapted solutions, e.g. increasing and ring-fencing dedicated trauma operating sessions, and expediting investigations and geriatrician ward rounds. The authors are now focusing on measures to address the delaying factors identified in the second audit. These include patients with nosocomial fractures or coagulopathy, and the availability of surgeons who can perform total hip replacement for hip fractures.

Similar evidence (Fisher et al, 2006; Marsland and Chadwick, 2010) underpins the emerging argument for increased investment in dedicated geriatric cover for hip fracture patients. Falls assessment, bone protection and multidisciplinary team rehabilitation proved easier to achieve (>95%). Unlike surgical delay and geriatric review, these targets are not time-limited and are considered fulfilled as long as they are achieved within the same patient episode. In practice they occur concurrently with the geriatrician's review and every patient seen would be expected to have been assessed for these targets.

There were some potential limitations of this audit. It is difficult to interpret audit findings in the presence of a multitude of multidisciplinary interventions being adopted. The Best Practice Tariff uplift did not translate into significant reductions in length of stay in the second year, or any appreciable reduction in 30-day mortality. This audit was not adequately powered to detect significant differences in these two outcomes.

Length of stay is a multifactorial issue, influenced not only by the patient's comorbidities (Khan et al, 2013), but also by logistical factors, e.g. the provision of supported discharge, availability of step-down and rehabilitation beds and transport. Thirty-day mortality is similarly influ-

Table 2. Comparison of the Best Practice Tariff targets over 2 years (Chi-squared test for categorical variables)

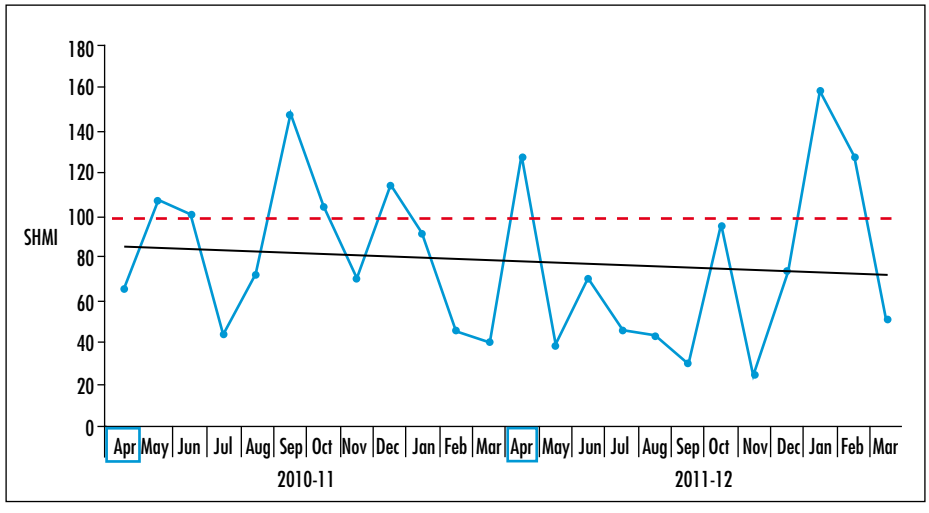
		2010–11 (*n*=410)	2011–12 (*n*=463)	*P* value χ^2
Surgery within 36 hours	Number	198	340	
	%	48.3	73.4	<0.0001
Geriatric review within 72 hours	Number	282	379	
	%	68.8	81.8	<0.0001
Bone protection	Number	375	456	
	%	91.4	98.5	<0.0001
Falls assessment	Number	409	463	
	%	99.7	100	0.95
Multidisciplinary team rehabilitation	Number	409	463	
	%	99.7	100	0.95
Best Practice Tariff achievement	Number	130	284	
	%	31.7	61.3	<0.0001

Table 3. Comparison of mortality and length of stay between the 2 years

	Mortality					Length of stay	
	Observed	Expected	SHMI	Lower CI	Upper CI	Mean	Standard deviation
2010–11	57	59	96.5	73	125	17.6	9.8
2011–12	39	63.6	61.3	43.5	84	18.4	10.2

CI = confidence interval; SHMI = summary hospital-level mortality indicator

Figure 1. The monthly summary-level hospital mortality indicator (SHMI) trend across the 2 years. The first months in both years are indicated with blue boxes. Red dashed line indicates SHMI = 100. The linear trend is shown by the dark thin line and indicates a reduction in the second year.



enced by several confounders, hence the reason for using a standardized short-term mortality indicator.

Conclusions

This is the first reported audit loop of compliance with Best Practice Tariff criteria for a large consecutive series (n=873) of patients with a fractured neck of femur treated at a tertiary centre with a dedicated consultant-delivered geriatric service. Interventions informed by the first audit increased 36-hour surgery and 72-hour geriatric reviews without significantly influencing length of stay and 30-day mortality. Larger prospective studies with adequate adjustment for confounders are required to determine whether this will have an impact upon length of stay and mortality rate. **BJHM**

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LEARNING POINTS

- There is much variability in the surgical delay target, which represents the multifactorial nature of this issue.
- Focusing on poorly satisfied Best Practice Tariff indicators can produce a significant improvement in these individual targets and in the per capita Best Practice Tariff achievement.
- While this seems to reduce 30-day mortality, further studies are needed to assess the health and financial gain from satisfying the Best Practice Tariff.