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# Effect of Covid-19 on best practice care of hip fracture patients: An analysis from the National Hip Fracture Database (NHFD)

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## ABSTRACT

**Background:** Best practice tariff (BPT) has brought significant improvements in hip fracture care; the 2019 report showing a 30-day mortality of 6.1%. Data relating to more than 65,000 patients who sustain a fractured neck of femur (FNOF) are recorded each year in the National Hip Fracture Database (NHFD). The aim of our study was to review the impact of COVID-19 on BPT.

**Methods:** Data was extracted from the NHFD for England, Wales and Northern Ireland. The months of March to June 2020 (lockdown period related to COVID-19) were compared to the same period in 2019. Data used in this study was collated and analysed between 14th and 17th October 2020.

**Results:** Data for more than 40,000 patients was reviewed. BPT dropped –4.3% in March, –12.6% in April, –12.9% in May 2020, and –7.2% in June. Prompt surgery remained stable (four-month average + 0.1%). The most significant changes were noted for timely orthogeriatric review (–7.6%,  $p < 0.001$ ), bone health assessment (–7.3%,  $p < 0.001$ ) and post-operative delirium assessment (–6.6%,  $p < 0.001$ ).

30-day mortality increased to 13.7% in March 2020 and remained high in April 2020 (11.3%) and May (7.3%). Acute hospital length of stay was lowest in May 2020 (11.7 days).

**Conclusion:** Patients sustaining FNOF in March 2020 had an associated 30-day mortality of 13.7%. During the COVID-19 pandemic, there was a significant reduction in BPT. The most significant changes were observed in timely orthogeriatric review.

Maintaining a high standard of multidisciplinary care for this vulnerable group of patients is crucial during future spikes of COVID-19.

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## Introduction

The National Hip Fracture Database (NHFD) was established in 2007 as collaboration between the British Orthopaedic Association (BOA) and the British Geriatrics Society (BGS) to collate data on hip fracture care and outcomes in England, Wales and Northern Ireland. Data relating to more than 65,000 patients who sustain a fractured neck of femur (NOF) are recorded each

year in NHFD.<sup>1</sup> There has been a progressive improvement in 30-day mortality of this vulnerable group of patients, with the most recent report showing a 30-day mortality of 6.1%.<sup>1</sup> The introduction of the ‘best practice tariff’ (BPT) in 2010 has brought significant improvements in hip fracture care.<sup>2,3</sup> BPT is a financial incentive to National Health Service (NHS) hospitals to meet pre-determined key performance indicators with the intention to improve patient outcomes, reduce length of stay and ultimately reduce care costs.<sup>4–6</sup> Integrated

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orthogeriatric care has been shown to improve patient morbidity and mortality, as well as reduce length of stay, and the importance of orthogeriatric input for this group of patients cannot be understated.<sup>7–10</sup> Indeed, the significant improvements in mortality achieved through the introduction of BPT can be largely attributed to collaborative orthopaedic-geriatric care.<sup>11,12</sup> Key performance indicators include prompt surgery and prompt orthogeriatric review, amongst others. In 2018, 90% of NOF patients received prompt orthogeriatric review and 69% received prompt surgery.<sup>1</sup> In the same year, the average acute hospital length of stay was 15.1 days.

The World Health Organisation declared COVID-19 a global pandemic on 11th March 2020.<sup>13</sup> COVID-19 has had a profound and unprecedented effect on the NHS, with drastic measures taken to increase hospital capacity. Elective orthopaedics has been no exception to this, with UK national guidance issued in March mandating that all non-urgent elective surgery be cancelled.<sup>14</sup> The effects of COVID-19 on trauma is a rapidly evolving research field, however, early reports suggest that healthcare systems have not observed a significant change in the number of fragility hip fractures.<sup>15,16</sup> Some centres in Italy reported an increase in the number of proximal femur fractures at the beginning of the pandemic.<sup>17</sup> In either case, management of this group of patients remains a public health priority. Published evidence thus far appears to demonstrate worse outcomes for those NOF patients testing positive for COVID-19. The IMPACT-Scot report recently reported a 30-day mortality of 35.5% in COVID-19 positive patients with a hip fracture.<sup>16</sup> However, this study also reported a 30-day

mortality of 8.3% in hip fracture patients who were COVID-negative during the pandemic. Similarly, Kayani et al. reported a 30-day mortality of 10.3% for COVID-negative patients.<sup>18</sup> It is not yet known how changes at an organisational level have affected hip fracture patients and the care they receive.

The primary aim of our study was to analyse the impact of COVID-19 on key performance indicators of the BPT during the national lock down period in 2020 using data from the NHFD. Our secondary aim was to review changes in mortality, length of stay, and the surgical management of NOF fractures during this period.

## Materials and methods

Data was extracted from the NHFD for England, Wales and Northern Ireland using the graphs and charts available online. The months of March–June 2020 (lockdown period related to first wave of COVID-19 pandemic) were compared to the same period in 2019. Absolute figures and percentages were recorded. Figures published online represent live data from the audit database. Length of stay and best practice care variables are reported by month of discharge, whereas data on 30-day mortality relate to month of admission. Data used in this study was collated and analysed between 14th and 17th October 2020. Differences for each month were calculated by subtracting the 2020 percentage from 2019 for each variable. Averages were then calculated, and Pearson chi-square analysis performed using absolute figures, in Microsoft Excel

**Table 1 – Compliance with key performance indicators (numbers 1–8) in the BPT. Also shown- Non-operative treatment of neck of femur fracture and percentage of total hip replacements (THR) in eligible patients. Months shown relate to month of discharge.**

	March		April		May		June		Average change (%)	p Value				
	2019	2020	2019	2020	2019	2020	2019	2020						
<b>Total Number</b>	5441	6370	5565	4963	5839	4909	5253	5032						
<b>Best Practice (%)</b>	62.4	58.1	-4.3	58.5	45.9	-12.6	55.9	43	-12.9	57.2	50	-7.2	-9.3	<0.001
Number	3395	3701	3256	2278	3264	2111	3005	2516						
<b>Prompt Surgery (%)</b>	73.4	71.2	-2.2	68.9	70.2	1.3	67.6	66.6	-1.0	66.7	69.2	2.5	0.1	0.013
Number	3994	4535	3834	3484	3947	3269	3504	3482						
<b>Orthogeriatric Assessment (%)</b>	92	90.6	-1.4	91.1	80.4	-10.7	88.9	78.7	-10.2	91	83.1	-7.9	-7.6	<0.001
Number	5006	5771	5070	3990	5191	3863	4780	4182						
<b>Pre-operative Cognitive Assessment (%)</b>	96.4	97.1	0.7	96.9	95.9	-1.0	95.7	95.5	-0.2	96.1	96.3	0.2	-0.1	0.831
Number	5245	6185	5392	4760	5588	4688	5048	4846						
<b>Bone Health Assessment (%)</b>	97.9	95.3	-2.6	97.6	87.5	-10.1	97.1	87.4	-9.7	97.4	90.8	-6.6	-7.3	<0.001
Number	5327	6071	5431	4343	5670	4290	5116	4569						
<b>Falls Assessment (%)</b>	97.2	97.3	0.1	96.8	91.1	-5.7	97	91.4	-5.6	97.5	92.8	-4.7	-4.0	<0.001
Number	5289	6198	5387	4521	5664	4487	5122	4670						
<b>Nutrition Assessment (%)</b>	96.9	96.9	0.0	96.9	94.2	-2.7	96.9	93.9	-3.0	96.8	95.7	-1.1	-1.7	0.030
Number	5272	6173	5392	4675	5658	4610	5085	4816						
<b>Post-op Delirium Assessment (%)</b>	93.6	92.6	-1.0	93.2	82.4	-10.8	93.1	83.1	-10.0	93	88.3	-4.7	-6.6	<0.001
Number	5093	5899	5187	4090	5436	4079	4885	4443						
<b>Physiotherapist Assessment (%)</b>	96.9	97.1	0.2	97.2	96.2	-1.0	96.9	97.1	0.2	97	97.2	0.2	-0.1	0.901
Number	5272	6185	5409	4774	5658	4767	5095	4891						
<b>THR where eligible (%)</b>	33.7	23.7	-10.0	35.3	18.2	-17.1	31.9	22.9	-9.0	36.1	22.3	-13.8	-12.5	<0.001
Number	1834	1510	1964	903	1863	1124	1896	1122						
<b>Non-operative treatment</b>	2.2	3.1	0.9	2.3	3.5	1.2	2.3	2.8	0.5	2.3	2.5	0.2	0.7	<0.001
Number	120	197	128	174	134	137	121	126						

(Microsoft Corporation, Redmond, Washington, USA). Statistical significance was set to  $p < 0.05$ .

Changes in each of the following BPT criteria were studied:

1. Time to surgery from arrival in an emergency department, or – if an admitted patient – time of diagnosis to the start of anaesthesia, is within 36 h (prompt surgery)
2. Assessed by a geriatrician in the perioperative period (within 72 h of admission)
3. An abbreviated mental test performed before surgery and the score recorded in NHFD
4. Assessment for bone protection
5. Specialist falls assessment
6. Nutritional assessment during the admission
7. Post-operative delirium assessment using the 4AT screening tool
8. Assessed by a physiotherapist the day of or day following surgery

In addition, we looked at length of stay, 30-day mortality, the proportion of patients being treated non-operatively and the proportion treated with total hip replacement where eligible.

## Results

This study includes data on length of stay and best practice care for 21,274 patients discharged in the months of 2020 compared to 22,098 patients in 2019. Best practice dropped  $-4.3\%$  in March,  $-12.6\%$  in April,  $-12.9\%$  in May, and  $-7.2\%$  in June. On average this represented a fall of  $-9.3\%$  during the pandemic ( $p < 0.001$ ). We looked at each of the BPT criteria to assess which indicators, if any, had the most significant impact on this change.

Prompt surgery (within 36 h of presentation) remained relatively stable throughout the pandemic, on average changing only  $+0.1\%$  over the four months studied ( $p = 0.013$ ). Prompt orthogeriatric review (within 72 h of presentation)

dropped by  $-1.4\%$  in March,  $-10.7\%$  in April,  $-10.2\%$  in May, and  $-7.9\%$  in June. On average, this represented a decrease of  $-7.6\%$  for the lockdown period ( $p < 0.001$ ). Significant changes were also observed in bone health assessment ( $-7.3\%$ ,  $p < 0.001$ ), falls assessment ( $-4.0\%$ ,  $p < 0.001$ ) and post-operative delirium assessment ( $-6.6\%$ ,  $p < 0.001$ ). Full results for BPT and absolute figures are shown in [Table 1](#).

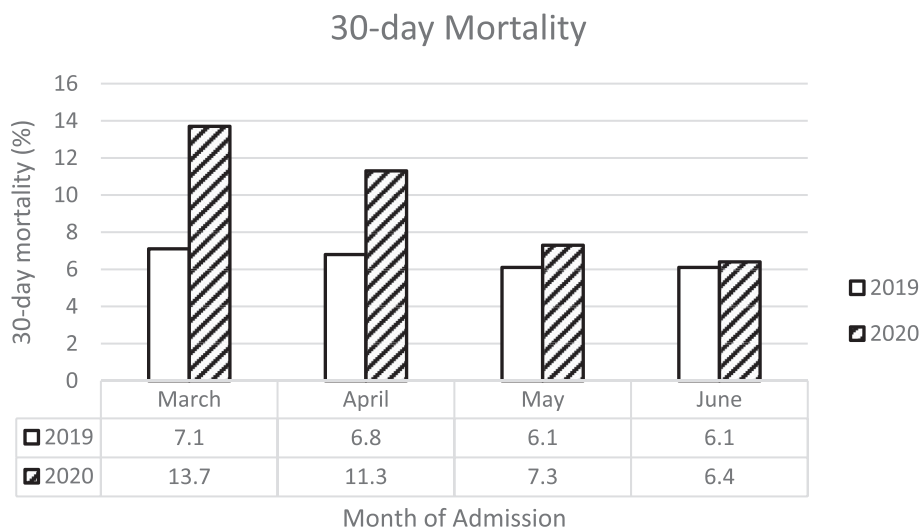
There was a small increase in the proportion of patients treated non-operatively, most significantly seen in April ( $+1.2\%$ ). However, most hip fracture patients continue to be treated with an operation. Fewer total hip replacements were observed in eligible patients. On average, there were  $-12.5\%$  fewer total hip replacements performed for eligible patients ( $p < 0.001$ ). This observation was most notable in the month of April ( $-17.1\%$ ). These results, alongside absolute figures, can also be seen in [Table 1](#).

Data on 30-day mortality is reported according to month of admission rather than month of discharge. The following figures relate to 20,200 patients admitted in the months of 2020 compared to 22,323 in 2019. Patients admitted in March 2020 had a 30-day mortality of  $13.7\%$ . 30-day mortality rates remained high through April ( $11.3\%$ ) and May ( $7.3\%$ ). Full results are shown in [Fig. 1](#).

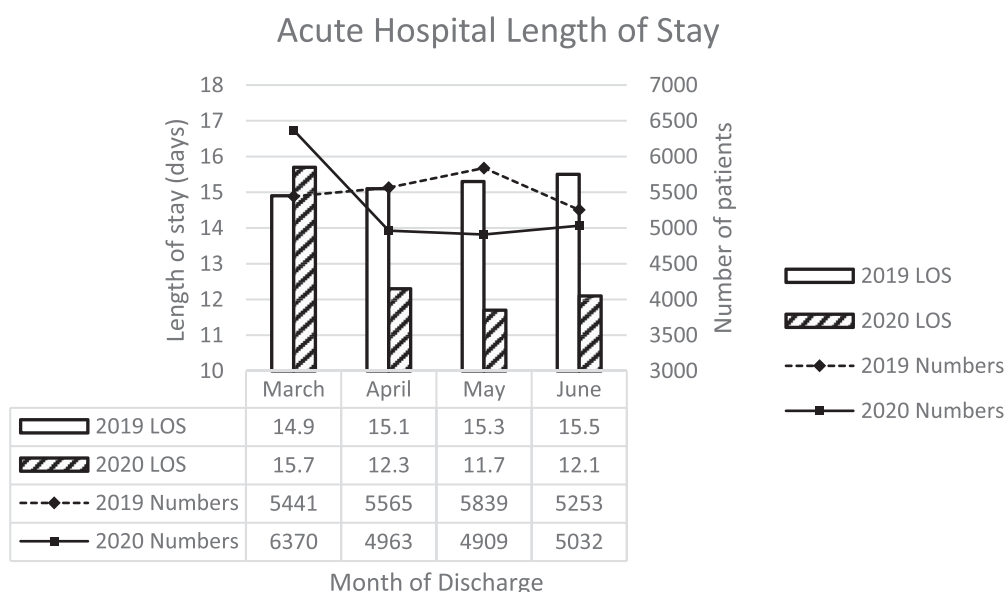
More patients were discharged in March 2020 vs March 2019 (6370 vs 5441, respectively). The number of patients discharged through April–June 2020 appears lower than in the same months in the previous year ([Fig. 2](#)). This may represent reduced NHFD reporting rates rather than fewer numbers. Average acute hospital length of stay was noted to drop significantly from April (12.3 days) and remained low through May (11.7 days) and June (12.1 days)- see results in [Fig. 2](#).

## Discussion

The data we have presented demonstrates that, despite the COVID-19 pandemic, the majority of hip fracture patients continue to be treated with an operation. For the months analysed within our study, rates of non-operative treatment



**Fig. 1 – Comparative 30-day mortality rates (%) by month of admission.**



**Fig. 2 – Comparative acute hospital length of stay (days) and number of patients discharged by month of discharge.**

ranged from 2.2 to 2.3% in 2019 compared to 2.5–3.5% in 2020. BOA standards for Trauma and Orthopaedics (BOAST) guidelines were updated during the pandemic and, where possible, encouraged non-operative treatment of general orthopaedic trauma.<sup>19</sup> However, decisions to operate on hip fracture patients have been less controversial owing to the important role of surgery in improving pain relief and allowing early rehabilitation, reducing inpatient stay.<sup>19,20</sup> This finding is reassuring for the hip fracture population. Furthermore, there appears to be some evidence to suggest that the benefits of prompt surgery for hip fracture patients may also be conferred to those who are COVID-19 positive.<sup>21</sup>

Where operative intervention was taken, there was a significant drop in the percentage of eligible patients undergoing total hip replacement (THR) for NOF fracture (–12.5%,  $p < 0.001$ ). NICE guidance recommends THR should be offered to patients with a displaced intracapsular hip fracture if they were able to walk with no more than a single stick, are cognitively sound, and are medically fit to undergo the operation.<sup>22</sup> However, updated BOAST guidelines advocated hemiarthroplasty during the pandemic to minimise operative time and blood loss.<sup>23</sup> In addition, this change in practice may have been influenced by a recent randomised controlled trial demonstrating no difference between THR and hemiarthroplasty for independently ambulating patients.<sup>24</sup> Whether this change in the surgical management of intracapsular hip fractures persists longer term remains to be seen.

Our analysis of NHFD data demonstrates that the most significant effect on BPT was related to the drop in timely orthogeriatric review of hip fracture patients. Significant changes were also observed in other parameters influenced by the orthogeriatric team such as bone health assessment, falls assessment and post-operative delirium assessment. We have already highlighted the importance of orthogeriatric care in improving mortality in hip fracture patients.<sup>10,12</sup> In addition, the occurrence of a fragility fracture is the strongest

risk factor for subsequent fracture and therefore secondary prevention strategies are essential to reduce morbidity and mortality.<sup>25</sup> Similarly, orthogeriatric input has been shown to reduce post-operative delirium in hip fracture patients<sup>27</sup> and delirium is independently associated with poor functional recovery after hip fracture.<sup>28</sup> It follows that these aspects of BPT are crucial for optimal multidisciplinary care of this vulnerable group of patients.

These changes may be explained by changes at an organisational level to care pathways and staff redeployment. Many trusts have now adopted care pathways to segregate positive and negative COVID-19 patients. At our own institution, all NOF patients are swabbed on admission and then isolated in cubicles on a COVID-19 pending ward. Once swab results are known they are relocated to either the COVID-19 negative orthopaedic ward or to a COVID-19 positive section of the hospital. This process delays access to the orthopaedic ward, where daily orthogeriatric input is routine or, worse still, distances COVID positive patients from this service. Similar systems and associated dilemmas have been described at other centres.<sup>26</sup> Given the continuing pressures from COVID-19 in NHS Trusts across the country, we would advocate a rigorous system at all centres to identify and highlight new NOF patients for orthogeriatric review, to ensure outlying patients are not missed.

Delays in orthogeriatric review may also have been influenced by the redeployment of senior clinicians from the care of the elderly team to acute medical wards. The unpredictable nature of the COVID-19 pandemic required planning for the worst and subsequently staff from other specialties were redeployed to cope with potential increases in acute medical admissions.<sup>29–32</sup> The annual medical and social care cost for UK hip fracture patient care is estimated at approximately £2 billion.<sup>33</sup> If hip fracture admissions have remained stable,<sup>15,16</sup> or even increased,<sup>17</sup> as reported, then management of these patients during a global pandemic remains a public health priority. The NHFD facilities survey last year

demonstrated that organisations are beginning to recognise the importance of orthogeriatric care, and subsequently are increasing orthogeriatric support on hip fracture wards.<sup>34</sup> This should remain an important principle in managing hip fracture patients during the evolving second wave of COVID-19, or for future pandemics.

30-day mortality for this group of patients increased to 13.7% in March 2020. Undoubtedly this figure will be offset by a proportion of patients who suffered the complications of COVID-19 infection. However, recent studies have also shown higher mortality rates for COVID-negative hip fracture patients during the pandemic.<sup>16,18</sup> The cause for the excess mortality is likely multifactorial. National pressure to increase hospital capacity during the pandemic may have contributed to the reduced length of hospital stay observed in our study. However, it is possible that such significant reduction in length of stay is not necessarily associated with better outcomes for this group of patients. We have also highlighted a significant fall in BPT during the pandemic and we have discussed the importance of BPT parameters in improving patient morbidity and mortality. As we recover from the 2020 pandemic, return of the orthogeriatric service to NOF wards should be a top priority, if BPT standards and patient mortality levels are to be restored to pre-pandemic levels.

### Limitations

Our study uses data from NHFD which relies on the accuracy of data input by clinicians and healthcare workers at local centres. Patient numbers in our study are lower for 2020 compared to 2019. It is likely this represents a lower reporting rate rather than a lower incidence of hip fracture during the pandemic. Nevertheless, with over 20,000 patients for each period studied we feel reasonable observations can be drawn from this dataset.

### Conclusion

Patients with hip fracture who meet BPT criteria have better outcomes.<sup>4–6</sup> Review by Orthogeriatrics is an important element of BPT and benefits this group of patients in many ways.<sup>7–12,27</sup> It is important that during further waves of COVID-19, or any other global or local crisis, this vulnerable group of patients are not forgotten about. Maintaining a timely review of the patients by the orthogeriatric team is paramount to offer holistic care following hip fracture. Balancing the priorities of continuing good practice in hip fracture care, versus redeployment of staff and resources to meet the demand elsewhere in hospital, is a difficult task for organisational leadership to consider in a second wave of COVID-19 or any future pandemic.

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