The decline of elective operating at major trauma centres

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ABSTRACT

INTRODUCTION Major trauma is a leading cause of death in those aged under 40 years. In order to improve the care for multiply injured patients, the major trauma network was activated in April 2012 in England. Its goal was to link all district hospitals to major trauma centres (MTCs) and allow for rapid transfer of patients. Anecdotally, this has affected elective orthopaedic operating at MTCs. The aim of this study was to compare the number of lower limb arthroplasty procedures performed before and after the establishment of the trauma network.

METHODS Data on hip and knee arthroplasties in England during the two years prior to and the two years following the introduction of the trauma network were obtained from the National Joint Registry. These were broken down by type of unit (MTCs vs non-MTCs). Differences between the number of hip and knee arthroplasties undertaken in the two time periods were analysed. The chi-squared test was used to assess statistical significance.

RESULTS The total number of lower limb arthroplasties increased after the activation of the trauma network by 5.5% (from 211,453 to 223,119). When stratifying the data by type of unit, this increasing trend was present for non-MTCs; however, in MTCs, a reduction occurred: the number reduced by 13.6% (from 13,492 to 11,657). This reversal of trend was seen in both hip and knee procedures independently (both $p < 0.01$).

CONCLUSIONS The introduction of the trauma network has led to a reduction in the total number of lower limb arthroplasty procedures performed in MTCs. Various reasons have been postulated for this but its impact on surgical training and hospital finances must be scrutinised in future research.

KEYWORDS

Trauma network – Major trauma centre – Arthroplasty – National Joint Registry – Elective – Trauma

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Major trauma is a leading cause of death in those aged under 40 years¹ and causes significant morbidity. The National Audit Office revealed considerable variation in the care provided throughout the UK in the context of major trauma.² This led to the establishment of 22 major trauma centres (MTCs) in England.³ These units are level 1 centres with 24-hour access to care from all trauma subspecialties that accept patients from other regional hospitals based on the mechanism and nature of their injuries as well as their vital signs.

The major trauma network was activated in April 2012 in England to link all district hospitals to MTCs, with the aim of improving care delivered to multiply injured patients.³ Indeed, MacKenzie *et al* showed that the mortality rate for major trauma patients in MTCs was significantly lower than in non-trauma centres (one-year relative risk: 0.75, 95% confidence interval: 0.60–0.95).⁴

The decision to transfer patients to a MTC can be made by paramedics at the scene or from the emergency department of peripheral hospitals.⁵ It has therefore been postulated that

the transfer of more complex trauma patients to MTCs can have a negative effect on the treatment of more common trauma such as neck of femur (NOF) fractures in MTCs. Wong *et al* investigated patients presenting with fractured NOF to MTCs prior to and following the introduction of the trauma network.⁵ They used national NOF targets⁶ to compare this treatment, which include criteria such as surgery within 36 hours. Although MTCs generally fared worse in reaching these targets, there had been an improvement in the proportion of patients undergoing their operation within 36 hours.⁵ It was concluded that the trauma network had not had a deleterious effect on the care of patients with fractured NOF.

However, the effect of the trauma network on elective orthopaedic operating has not been investigated to date. Lower limb (hip and knee) arthroplasty is seen as a good measure of elective orthopaedic workload and the details are recorded accurately in the National Joint Registry (NJR).⁷ It has been highlighted anecdotally that elective orthopaedic surgery has suffered as a result of the

introduction of the major trauma network. The aim of this study was to compare the number of total hip and knee replacements performed before and after the establishment of the trauma network to assess whether there has been a reduction in the number of elective orthopaedic operations carried out in MTCs.

Methods

NJR data are published on the registry website and are readily available for the general public to access.⁷ This system has been in place since April 2005, and hospitals are mandated to keep and submit an accurate report of their arthroplasty data. For our analysis, Excel® (Microsoft, Redmond, WA, US) files were downloaded from the NJR website with data for all hip and knee arthroplasties performed in England over the periods April 2010 to March 2012 and April 2012 to March 2014 (the two years before and the two years after the introduction of the trauma network).

These data were grouped by type of unit (MTCs vs non-MTCs). The four dedicated children's MTCs and the two collaborative MTCs were excluded from analysis. As a result, 20 MTCs were included in the study (8 adult MTCs, and 12 combined adult and children's MTCs). The numbers of arthroplasties undertaken at the 20 MTCs were compared with those performed at the 141 non-MTCs. A contingency table was created and the chi-squared test was used to compare differences. Statistical analysis was carried out using Excel® and a *p*-value of <0.05 was considered statistically significant.

Results

Overall, 434,572 total hip and knee arthroplasty procedures were performed in England between April 2010 and March 2014. There was an increase in the total number of arthroplasties undertaken in the latter two years of this time period (after the establishment of the trauma network) compared with the first two years, from 211,453 to 223,119.

When stratifying the data by type of unit, this increasing trend was present for non-MTCs; conversely, there was a statistically significant reduction in the number of arthroplasties performed in MTCs (Table 1). This was the case for both hip and knee procedures when evaluated separately (both *p*<0.01).

Discussion

This paper highlights an important finding. Although Wong *et al* showed that the proportion of fractured NOF patients receiving surgery within 36 hours increased (for both MTCs and non-MTCs) following the introduction of the trauma network,⁵ the network has clearly had a detrimental effect on the number of elective lower limb arthroplasties carried out in MTCs. This difference is so marked that the general upward trend in terms of the overall numbers was reversed for MTCs.

Several reasons for this effect have been postulated. Major trauma cases are more time urgent owing to the nature of

Table 1 The number of lower limb arthroplasties performed at major trauma centres (MTCs) and other hospitals

Type of unit	Type of procedure	April 2010 – March 2012	April 2012 – March 2014	% Change
MTCs	Hip	6,849	6,301	-8.0%
	Knee	6,643	5,356	-19.4%
	Total	13,492	11,657	-13.6%
Non-MTCs	Hip	94,504	102,632	+8.6%
	Knee	103,457	108,830	+5.2%
	Total	197,961	211,462	+6.8%
Total		211,453	223,119	+5.5%

the injury (eg severe open fractures, stabilisation of pelvic fractures, neurovascular injury), which leads to their prioritisation over other cases. These cases tend to take up more theatre time because of the more complex nature of the surgery and they may also involve multiple separate operative procedures (eg repeated wound debridement, fixation of separate fractures). Input from multiple surgical specialties (eg trauma and orthopaedics, plastic and general surgery) may be required in the same theatre. This involves logistical organisation and becomes time consuming.

Furthermore, there are often concomitant injuries that require intensive care input. Transferring intubated patients from the intensive care unit and preparing them for a complex operation requires more time. In addition, major trauma patients can have a longer inpatient stay owing to a requirement for multiple procedures or postoperative rehabilitation. Although there is a system of repatriation for patients transferred from other hospitals, these patients still need an inpatient bed for longer than a primary hip or knee replacement patient. This may affect the availability of beds for elective arthroplasty patients in MTCs.

The fact that severely injured patients are transferred from peripheral hospitals to MTCs can have a dual impact. It reduces the complex trauma workload of non-MTCs, thereby liberating theatre time and inpatient beds for elective cases in these hospitals, while the opposite occurs in MTCs. This has been clearly demonstrated by the NJR figures. The general effect of the trauma network has undoubtedly been positive in terms of the care of trauma patients;⁴ however, its impact on specialty training and hospital finances has yet to be fully analysed.

Conclusions

There has been a clear reduction in the overall number of lower limb arthroplasties performed per year in MTCs since the introduction of the major trauma network. In contrast, there has been an increase in the number of elective arthroplasties undertaken in non-MTC hospitals. This change is highly statistically significant, and its wider effect on higher surgical training and hospital finances should be further analysed.

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