

# Military trauma and orthopaedics experience of the UK COVID-19 pandemic: a lesson in versatility and how it can influence our deployed role

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## ABSTRACT

The COVID-19 pandemic necessitated unprecedented change within the NHS. Some medical staff have been deployed into unfamiliar roles, while others have been exposed to innovative ways of working. The embedded military Trauma and Orthopaedic (T&O) cadre have been integral to this change. Many of these new skills and ways of working learnt will be transferable to deployed environments. Feedback from the T&O military cadre highlighted key areas of learning as changes in T&O services, use of technology, personal protective equipment, redeployment and training. This paper aims to discuss how these changes were implemented and how they could be used within future military roles. The T&O cadre played important roles within their NHS trusts and the skills they learnt will broaden their skills and knowledge for future deployments.

## INTRODUCTION

During the COVID-19 pandemic, unprecedented changes have been seen within the NHS. On 23 March 2020, the UK entered 'lockdown' with all elective and non-emergency operating cancelled.<sup>1,2</sup> Staff were redeployed into alternative roles to help in areas stretched to capacity, requiring clinicians to adapt and learn new skills.<sup>3</sup> Departments reviewed their patient pathways to reduce the burden on the system and the risk of exposure to patients.<sup>4</sup> With most 'day-to day' work cancelled or modified, Trusts and the British Orthopaedic Association (BOA)

issued guidance<sup>5</sup> for Trauma and Orthopaedic (T&O) surgeons on novel ways of working.

The military T&O consultants and trainees embedded in the NHS across the country played their part. The approach mirrored the culture of versatility and cohesiveness shown by the cadre on previous operational deployments. The military's role within the NHS provided an opportunity to learn and capture lessons to take forward into its doctrine. Surgeon Vice Admiral Walker identified the "cyclical pattern of war time improvement and post-war dips in performance"; he coined this the "Walker Dip".<sup>6,7</sup> The aim of this personal view is to highlight lessons learnt by the T&O cadre during the pandemic which are transferrable and can be adapted to suit future deployed environments. Feedback from the T&O military cadre highlighted key areas of learning as changes in T&O services, use of technology, personal protective equipment (PPE), redeployment and training.

## Trauma and orthopaedics services

T&O units across the country have had to adapt their ways of working following guidance from NHS England and the BOA.<sup>5</sup> The guidance highlights two overarching principles; the first was to reduce the exposure risk to patients and staff. This was achieved by increasing the use of virtual consultations, raising the threshold for surgery (due to risks during intubation) and adapting patient pathways to reduce follow-up. The second was to assist other services. This was achieved by redeploying staff to over stretched specialties, reducing operation numbers to free up ventilators and diverting patients away from A&E to newly set up Minor Injury Units (MIUs).

Military T&O surgeons assisted in the set-up of MIUs within their trusts. MIU models varied from those embedded within A&E to adapting fracture clinics. Where available, some had plastic surgical teams working along-side, as well as physios, advanced nurse practitioners and hand therapists. One trainee described it as the "one-stop shop" for fractures.

MIUs have also allowed for the introduction of new interventions to aide practice. This includes the use of image intensifiers outside the operating theatre and the use Pentrox (methoxyflurane) when reducing fractures. Previous work highlights a lack of imaging can limit the ability to achieve a good reduction.<sup>6</sup> Further, a small study using ultrasound for distal radius fractures has shown imaging in A&E can improve reduction and reduce the need for further operative intervention.<sup>7</sup> Pentrox, an alternative inhaled analgesic to nitrous oxide, was being increasingly used in A&E departments prior to COVID-19, but was adopted more widely throughout the pandemic. It has been shown to give a good analgesic response, is easy to use and is being considered for use by the Army.<sup>8,9</sup> Such tools are useful in a resource-limited deployment and could be pushed forward to Role 1 (forward medical facility with primary care and pre-hospital capabilities) if required.

Disease non-battle injuries (DNBIs) have always been the highest burden of casualties in war throughout history.<sup>10</sup> In the recent UN peacekeeping mission, Op TRENTON, in South Sudan, the majority of the medical burden was DNBI and was treated by the Role 1 facility. Outbreaks of infective illnesses were common; gastroenteritis made up 26% of all Role 1 presentations, while musculoskeletal (MSK) injury still remained prominent, making up 9% of Role 1 presentations.<sup>11</sup> In the instance of an infective outbreak on deployment, the ability to rapidly set up MIUs led by T&O may help relieve some of this load from the Role 1 facilities by diverting MSK injuries. Assistance in controlling outbreaks could also be readily offered by T&O clinicians given the experience gained in reducing exposure to patients during the pandemic.

Patients undergoing surgery were initially thought to have a significant increase in morbidity and mortality as a result of COVID-19.<sup>12</sup> As such, the threshold for surgical fixation was increased, meaning more conservative management. Illustrative of this, the John Chanley Trust released a free PDF of 'The Closed Treatment of Common Fractures'.<sup>13</sup> The rise in surgical fixation options in recent decades has meant casting is often seen as a dying art.<sup>14</sup> In recent years, however, we have seen a number of pragmatic trials looking at the efficacy of conservative management, for example, ProFHER and DRAFFT 2.<sup>15,16</sup> The undertaking of such trials may be indicative of a growing trend back to conservative management. The pandemic

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will likely see a rise in conservative management, the long-term outcomes of which (once available) will require careful analysis.

The active effort to reduce patient visits and admission to hospital has been guided by the BOA.<sup>5</sup> Application of this guidance has included casts that can be removed at home, use of resorbable sutures in place of non-absorbable sutures, and needle aspiration of septic joints until dry combined with antibiotics. Such measures are suited to the resource-limited or high casualty environment. These quick interventions could help reduce the need for moving casualties across the battle space and be aides in prolonged field care. They may be of greater use when treating foreign nationals or displaced people without access to medical follow-up on discharge from a UK military facility.

### Use of technology

Technology has played a major role during the pandemic across all sectors. Teleconferencing has allowed work to continue without having to meet face to face. This has included multidisciplinary team meetings, trauma meetings, patient clinics and virtual fracture clinics (VFCs).

The VFC has been shown as an effective way of managing patients remotely and is common practice across the UK.<sup>17</sup> Use of VFCs increased in response to COVID-19. An advantage of this model is patients can be managed remotely and potentially from across the globe. Currently, military personnel at home and abroad are managed by their local secondary care system and receive military input on request. The VFC set-up could offer an opportunity to manage and monitor military personnel who are injured at home and abroad, directing them to the appropriate UK military specialist. In particular, where healthcare abroad can be costly (eg, BATUS, Canada), a VFC could offer a semi-urgent service to reduce the need for local healthcare involvement.

Within the military, we have been using telemedicine to help deliver healthcare in remote parts of the world for a number of years. This could be through access to Defence Consultant Advisors via phone or virtual trauma meeting like those held between Bastion and the Royal Centre for Defence Medicine during Op HERRICK. Exposure to telemedicine on a daily basis helps mitigate against skill fade of the peculiarities of communicating remotely and places military surgeons in a position to use technology effectively while deployed.

### Personal protective equipment

The difficulties of working in PPE is not something new to the military. All military personnel have trained in the Chemical, Biological, Radiological and Nuclear (CBRN) environment. These skills were recently used when responding to the Novichok attack in Salisbury. The medical services also developed robust systems for donning and doffing PPE while working in Sierra Leone during the Ebola Crisis. Operating on patients in 'full PPE' will however be new to most NHS colleagues and presented a number of challenges. These included communication, maintaining sterility and degradation of equipment. Some innovative ideas have been developed during the pandemic, including communication equipment worn under PPE.<sup>18</sup> These warrant further investigation for use in the deployed environment.

PPE guidelines varied across hospital trusts depending on the evolving clinical information. COVID-19 is likely to remain a global issue for months or years to come. The military must develop a unified PPE policy and adapt its deployable modules to reflect this for use on operations. We have all seen the logistical burden it has had on the NHS; this will also be a significant issue when supplying deployed medical facilities. Clinicians identified spending long periods operating in PPE highlighted a physical toll on both the user and the PPE. PPE should be robust in challenging, hot and low-resource environments, if it is to be used effectively on operations.

### Redeployment

T&O clinicians have been redeployed within proning teams, A&E departments and ITU teams. In spite of the Wuhan data<sup>19</sup> illustrating the risk COVID-19 has for clinicians, discussions have highlighted the willingness of individuals to step up and volunteer in unfamiliar roles. Those within the T&O cadre have commented, at times, it felt like being on operational tour; teams have come together in challenging conditions to work hard towards a common goal.

Members of the cadre who worked within ITU teams were provided with a short induction phase combined with continued learning. An induction was mandated by both the General Medical Council and NHS<sup>3</sup>; trainees reported it as being a useful and effective part of the redeployment process. While working in new roles, these trainees acquired valuable skills. Military surgeons may be deployed on operations into small teams made up of individual specialties. The newly acquired

skills could become invaluable in a small team, should there be a requirement to assist outside of the scope of their normal practice. A similar induction could be considered in pre-deployment training to allow teams to have some limited cross cover in case of injury or intense periods.

Examples of leadership roles across the hospital have been demonstrated. These include leading proning teams and designing/coordinating rapidly evolving work patterns. Military clinicians were able to use their experience to guide and set up structures to aid planning, create reporting pathways and develop long-term strategies. This has shown the versatility a military orthopaedic surgeon can offer.

### Training

Many have advocated consultant-delivered services during the initial phase of the pandemic. This is similar to that in the deployed setting where, at present, trainees do not deploy. As we begin to transition out of the first phase and with a view to speeding up recovery, there may be recommendations for services to remain consultant delivered. Concerns have been raised this will limit trainee experience and impact training. The Joint Committee for Surgical Training have released statements supporting trainee progression, including facilitating opportunities to gain experience within the private sector.<sup>20</sup> The military must be aware that training opportunities remain a challenge and may have an impact for orthopaedic trainees and their future deployability.

### CONCLUSION

The NHS has had to implement rapid changes in response to COVID-19. Military T&O surgeons have been facilitating these changes within their Trusts. This has meant adapting T&O practices to meet the new needs of both staff and patients. As the NHS moves out of the first phase of COVID-19, it must aim to keep and develop many of the new practices adopted. Some NHS innovations such as the use of telemedicine are not new to the military but will increase our readiness to deploy. New practices including MIUs and conservative management of patient can be adapted to suit the operational environment and enhance T&O skill sets. As we face this ongoing pandemic and any new biological threats in the future, we must be prepared with the correct PPE. All these experiences will help the T&O cadre adapt and operate more effectively within its military role, as well as continue to give support to the NHS.

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#### REFERENCES

- Hampton M, Clark M, Baxter J, *et al.* The effects of a UK lockdown on orthopaedic trauma admissions and surgical cases. *Bone Jt Open* 2020;1:137–43.
- Weissman DN, de Perio MA, Radonovich LJ. COVID-19 and risks posed to personnel during endotracheal intubation. *JAMA* 2020;323:2027.
- NHS England. Redeploying your secondary care medical workforce safely, 2020. Available: <https://www.hee.nhs.uk/coronavirus->
- NHS England and NHS Improvements. Clinical guide for the management of trauma and orthopaedic patients during the coronavirus pandemic, 2020. Available: <https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/CO274-Specialty-guide-Orthopaedic-trauma-v2-14-April.pdf>
- British Orthopaedic Association. BOAST – management of patients with urgent orthopaedic conditions and trauma during the coronavirus pandemic, 2020. Available: <https://www.boa.ac.uk/resources/covid-19-boasts-combined.html>
- Schofield S, Schutz J, Babi FE, *et al.* Procedural sedation and analgesia for reduction of distal forearm fractures in the paediatric emergency department: a clinical survey. *Emerg Med Australas* 2013;25:241–7.
- Chinnock B, Khaletskiy A, Kuo K, *et al.* Ultrasound-guided reduction of distal radius fractures. *J Emerg Med* 2011.
- Coffey F, Wright J, Hartshorn S, *et al.* STOP!: a randomised, double-blind, placebo-controlled study of the efficacy and safety of methoxyflurane for the treatment of acute pain. *Emerg Med J* 2014;31:613–8.
- Cohen HML, Wolstenholme R. Pentrox: a breath of PHEC air for the military? *BMJ Mil Health* 2020;166:1–4.
- Chern A, McCoy A, Brannock T, *et al.* Incidence and risk factors for disease and non-battle injury aboard the hospital SHIP USNS comfort during a humanitarian assistance and disaster response mission, continuing promise 2011. *Trop Dis Travel Med Vaccines* 2015.
- Bonham CT, Pallett SJC, Holland TJ. Op TRENTON 3: an analysis of primary care presentations to a deployed role 1 in support of a United Nation peacekeeping operation. *J R Army Med Corps* 2019. doi:10.1136/bramc-2019-001203
- CovidSurg Collaborative. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2. *Lancet* 2020:1–12.
- Chamley J. *The closed treatment of common fractures*. 4th edn. Cambridge University Press, 2020.
- Sinha I, Barr L, Lee M. The dying art of plastering: a survey of orthopaedic trainees' plastering experience. *Bull R Coll Surg Engl* 2006.
- Handoll HH, Keding A, Corbacho B, *et al.* Five-year follow-up results of the PROFHER trial comparing operative and non-operative treatment of adults with a displaced fracture of the proximal humerus. *Bone Joint J* 2017;99-B:383–92. doi:10.1302/0301-620X.99B3.BJJ-2016-1028
- Achten J, Sones W, Dias J, *et al.* Surgical fixation with K-wires versus plaster casting in the treatment of dorsally displaced distal radius fractures: protocol for Distal Radius Acute Fracture Fixation Trial 2 (DRAFFT 2). *BMJ Open* 2019;9:e028474. doi:10.1136/bmjopen-2018-028474
- McKirdy A, Imbuldeniya AM. The clinical and cost effectiveness of a virtual fracture clinic service. *Bone Joint Res* 2017.
- Birchall M. Technology can help us to overcome the challenges of wearing full PPE in the operating theatre. Available: [www.rcseng.ac.uk](http://www.rcseng.ac.uk)
- Guo X, Wang J, Hu D, *et al.* Survey of COVID-19 disease among orthopaedic surgeons in Wuhan, People's Republic of China. *J Bone Jt Surg* 2020.
- September HEE. *HEE/NHSE Joint Position Statement: Ensuring Education and Training in the Independent Sector*, 2020: 1–7.