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## **A PILOT STUDY TO EVALUATE THE UTILITY OF LIVE TRAINING (LIVEX) IN THE OPERATIONAL PREPAREDNESS OF UK MILITARY TRAUMA TEAMS**

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## **Abstract**

### **Background**

With the end of UK military operations in Iraq and Afghanistan, it is essential that peacetime training of Defence Medical Services (DMS) trauma teams ensures appropriate future preparedness. A new model of pre-deployment training involves placement of formed military trauma teams into civilian trauma centres. This study evaluates the benefit of 'live training during an exercise period' (LIVEX) for DMS trauma teams.

### **Methods**

A cross sectional questionnaire-based survey of participants was conducted. Quantitative data were collected prior to the start and on the final day. Written reports were collected from the coordinators. Thematic analysis was used to identify emergent themes in a supplementary, qualitative analysis.

### **Results**

Each team comprised 13 personnel and results should be interpreted with knowledge of this small sample size. The response rate for both the pre-and post-LIVEX questionnaire was 100%.

By the end of the week, 89% of participants (n=23) stated LIVEX was an 'appropriate or very appropriate' way of preparing for an operational role, compared to 40% (n=9) before the exercise ( $p < 0.01$ ). However, completing LIVEX made no difference to participants' personal perception of their own operational preparedness.

Thematic analysis suggested greater training benefit for more junior members of the team; from Regulars and Reservists training together; and from two-way exchange of information between DMS and NHS medical staffs.

### **Conclusion**

Completing LIVEX made no statistically significant difference to participants' personal perception of their own operational preparedness, but the perception of LIVEX as an appropriate training platform improved significantly after conducting the training exercise.

## **Background**

Defence Medical Services (DMS) trauma teams deliver exemplary clinical care, with evidence of saving the lives of patients with the severest of injuries [1, 2]. Trauma team preparation for military operations involves a pre-deployment training package covering core military and medical skills, a whole hospital exercise (HOSPEX) [3] and the Military Operational Surgical Training (MOST) course [4]. During recent military campaigns in Iraq and Afghanistan this has been underpinned by a wealth of operational experience within the deploying clinician cadres and the rapid, progressive feedback and integration of lessons learned into pre-deployment training. With the end of these campaigns, it is essential that the peacetime training of DMS trauma teams mitigates the risk of fading operational experience, and ensures appropriate future preparedness.

A different model of pre-deployment training, used by the US Armed Forces, involves the placement of military personnel in formed teams into civilian trauma centres to deal with complex injuries. Such 'live training during an exercise period' (LIVEX) has not yet been evaluated within the UK.

The aim of evaluating LIVEX in the UK is to determine any added benefit of pre-deployment training in a real-world environment, over training in a sophisticated simulated environment (HOSPEX, MOST). If demonstrated, this will shape the requirement for future operational clinical preparedness. This pilot study focuses on the benefit to the Emergency Department (ED) and Operating Theatre teams as representative of the whole-hospital response to the critically injured Serviceman.

## **Methods**

The LIVEX pilot study took place in January 2015. DMS trauma teams (ED + Operating Theatre components) were placed concomitantly in two NHS Major Trauma Centres in London, St Mary's Hospital (SMH) and the Royal London Hospital (RLH), for a period of seven days. The hospitals were selected for having a recorded high volume of major trauma cases (Injury Severity Score  $\geq 16$ ); a proportion of penetrating as well as blunt trauma; a case mix that demanded a relatively high rate of operative intervention; and an established collaborative relationship with DMS, including senior military clinical staff embedded in both host Trusts. Personnel were selected for LIVEX to give a deliberate mix of Regular and Reservist staff, operational experience, and multidisciplinary participants. Variance in the experience between the two hospitals was minimised by conducting LIVEX at the same time over both sites in the same city (correcting, for example, for the ability for cases to arrive by air ambulance); and by standardising the format of the exercise and planned contact time with patients through prior liaison between the two hospitals.

A questionnaire-based survey of participants was conducted prior to the start of LIVEX and again on the final day. Comparative statistical analysis using STATA explored the training outcomes of Regular versus Reservist personnel; nurses and allied health professionals versus doctors; and experienced (those who had

deployed to Iraq and/or Afghanistan five or more times) versus the less operationally experienced (those who had deployed to Iraq and/or Afghanistan less than five times).

Written reports were collected from the LIVEX military coordinators at SMH and RLH. Thematic analysis was used to identify emergent themes and messages in a supplementary, qualitative analysis.

## **Results**

Each LIVEX trauma team comprised 13 personnel and results should be interpreted with knowledge of this limited sample. Participant demographics are shown in Table 1. There were no statistically significant differences in the demographics of the SMH and RLH teams. The response rate for both the pre- and post-LIVEX questionnaire survey was 100% (n=26).

By the end of the week, 89% of participants (n=23) stated LIVEX was an 'appropriate or very appropriate' way of preparing for an operational role, compared to 40% (n=9) who held this view before the exercise ( $p<0.01$ ). However, completing LIVEX made no statistically significant difference to the selected participants' personal perception of their own operational preparedness ( $p=0.95$ ). The sample group was heavily biased towards personnel with at least some operational experience (25/26, 96%) vs no experience (1/26, 4%).

There was no statistically significant difference in the perception of personal preparedness between hospital sites ( $p=0.62$ ); Regulars or Reservists ( $p=0.44$ ); nurses and allied health professionals compared to doctors ( $p=0.43$ ); or operationally experienced ( $\geq 5$  tours) compared to less experienced personnel ( $p=0.12$ ). However, these comparator groups were not evenly matched in all respects (80% had done  $<5$  tours; 69% were Regular service; 46% were doctors).

Free text commentary provided inferences of greater training benefit for more junior members of the team; recognition that more senior clinicians were required in the team to facilitate the appropriate team dynamic; benefit from Regulars and Reservists training together; and benefit from two-way exchange of information and experiences between DMS and NHS medical staffs.

**Table 1: Demographics of DMS trauma teams by NHS Major Trauma Centre**  
(SMH, St Mary's Hospital; RLH, Royal London Hospital; AHP, Allied Health Practitioner; JNCO, Junior Non-Commissioned Officer; SNCO, Senior Non-Commissioned Officer; WO, Warrant Officer; OF, Officer; DGH, District General Hospital; MTC, Major Trauma Centre)

		SMH n (%)	RLH n (%)	Total n (%)
Gender	Male	10 (77)	9 (69)	19 (73)
	Female	3 (23)	4 (31)	7 (27)
Role	Doctor	6 (46)	6 (46)	12 (46)
	Nurse	3 (23)	3 (23)	6 (23)
	AHP	4 (31)	4 (31)	8 (31)
Service	RN	2 (15)	2 (15)	4 (15)
	Army	9 (70)	10 (77)	19 (73)
	RAF	2 (15)	1 (8)	3 (12)
Engagement	Regular	8 (62)	10 (77)	18 (69)
	Reservist	5 (38)	3 (23)	8 (31)
Time in HM Forces	Median (years)	10	12	12
	IQR	3-18	11-15	5-17
Rank	JNCO	1 (7)	2 (15)	3 (12)
	SNCO/WO	3 (23)	4 (31)	7 (27)
	OF1/2	3 (23)	1 (7)	4 (15)
	OF3 and above	6 (47)	6 (47)	12 (46)
Operational experience	Yes	12 (92)	13 (100)	25 (96)
	No	1 (8)	0 (0)	1 (4)
Theatre of operations	Afghanistan only	7 (54)	7 (54)	14 (54)
	Iraq only	0 (0)	0(0)	0 (0)
	Afghanistan & Iraq	5 (38)	6 (46)	11 (42)
	Neither	1 (8)	0(0)	1(4)
Times deployed	0-4 times	9 (75)	11 (85)	20 (80)
	5 or more	3 (25)	2 (15)	5 (20)
Normal work place	DGH / non MTC	7 (54)	9 (69)	16 (62)
	MTC	5 (38)	4 (31)	9 (35)
	No response	1 (8)	0(0)	1 (3)

## Discussion

In this pilot study of a small group of relatively senior, operationally experienced DMS Regular and Reservist personnel, LIVEX did not enhance the perception of personal operational preparedness. Nevertheless, participants' perception of LIVEX as an appropriate training platform through which to deliver operational preparedness improved to a statistically significant degree as a result of their participation. Furthermore, this is a small pilot study (n=26) and some caution is needed in dismissing any difference between those that work regularly within Major Trauma Centres in UK and those that do not, in parallel with those who have prior operational experience and those who do not.

As Defence transitions from sustained medium scale campaigns to the likelihood

of smaller, shorter, contingent operations, the training and methods of operational preparedness of secondary care clinicians should be rightly reviewed and opportunities taken to optimise the protection of lessons learned in both Iraq and Afghanistan. The risk of fading of team skills to manage the most critically injured combat casualties must be mitigated. DMS clinicians need to retain the confidence and competence to deliver the same high quality care to these patients in the future. This stems from a combination of *sustaining* individual skills, together with *building* heightened efficiency that comes from a cohesive, rehearsed and self-organised team.

Training comparisons can be drawn with methods to ensure the operational preparedness of other elements of the UK Armed Forces. All UK military personnel undertake regular weapons handling skills tests (analogous to clinical skills courses, such as *Battlefield Advanced Trauma Life Support*). Judgmental training using high fidelity simulators prepares Service personnel to develop, for example, their judgment in Rules of Engagement (when and when not to open fire)—this is analogous to the MOST course and HOSPEX scenarios to develop judgment in life-threatening clinical scenarios. However, Service personnel would opine that there is no substitute for previous combat experience in consolidating their judgment. Placing DMS personnel in Major Trauma Centres constitutes one such opportunity for ‘live firing’ experience in the clinical setting. This has neither been universally achieved, nor guarantees that the DMS clinician will be competent for their deployed role. Individual skills are necessarily supplemented and contextualised in preparation for deployment through HOSPEX and MOST team training. While highly sophisticated in their training and simulation models these programmes do not involve live patient treatment. It should be recognised, although may not be proven, that live patients generate an emotional response and a personal commitment that a simulated casualty cannot: it is unrealistic to assume the team dynamic and individual response to a casualty is unaffected by whether the casualty is human or a mannequin.

Following experiences in the Gulf War 1990-91, the US Congress enacted legislation in 1996 to ensure military clinicians were afforded training opportunities in civilian hospitals [5]. This catalysed several training programmes where military clinical teams are placed within civilian trauma centres [6,7]. By 2002, these included training programmes for US Army personnel at University of Miami/Ryder Trauma Center; US Navy personnel at the University of Southern California/Los Angeles County Medical Center; and US Air Force personnel at three Centers for the Sustainment of Trauma and Readiness Skills (C-STARS) within busy academic medical institutions (C-STARS Baltimore, St. Louis and Cincinnati) [6]. The programmes vary from 7-30 days, and include differing developmental modalities such as didactic lectures and skills, casualty simulation, team performance, expeditionary equipment familiarisation and live patient experience through the care of acute trauma patients [6, 8]. These programmes have increased the perception of operational preparedness amongst US clinical personnel [9]. Over 90% of participants undertaking the US Army programme in Miami, Florida, felt the training was

beneficial [10].

The potential benefits of LIVEX come neither as cost-neutral, nor without clinical risk. In future, a Memorandum of Understanding between the Ministry of Defence and each host NHS hospital may be required to cover costs including those associated with establishing honorary contracts for the DMS personnel (approximately £250 per person in one of the LIVEX sites), the loss of routine work for the host clinicians and hospitals, and the loss of contracted work at the participants' base units. Governance and assurance of the DMS interventions and medico-legal liability would need to be carefully considered. Indeed, the initial US training programme at the Joint Trauma Training Center, Houston, Texas was abandoned due to local State Medical Board concerns about potential malpractice claims [6].

When considering the potential UK utility of adopting current US practice, the cultural and health system differences between the two countries should not be ignored. US Armed Forces personnel are ubiquitously celebrated, whereas societal attitudes within the UK public are more circumspect: this could affect the will to deliver this level of mentored training at scale and to accept the associated institutional risk. Furthermore, the medical secondary care delivery model is very different in the USA. US military clinicians are based in military hospitals, whereas DMS secondary care clinicians are routinely based in the NHS and many are already in our Major Trauma Centres.

For the future—and recognising the governance, assurance and medico-legal challenges—it is recommended that the LIVEX programme continues in the short to medium term to permit further evaluation with a larger sample size, and the derivation of metrics to better demonstrate benefit (or not) in terms of DMS military trauma teams' operational preparedness.

## **Conclusion**

DMS trauma teams currently deliver exemplary trauma care, but there is a risk of skill fade following withdrawal from campaigns in Iraq and Afghanistan. To maintain operational preparedness, the US Armed Forces successfully deploy their military personnel into civilian trauma receiving hospitals. A pilot study at two NHS Major Trauma Centres in London evaluated the training benefit and utility for operational preparedness of a similar programme in the UK ('LIVEX'). Completing LIVEX made no statistically significant difference to participants' personal perception of their own operational preparedness, but the perception of LIVEX as an appropriate training platform through which to maintain operational preparedness improved significantly after conducting the training exercise.



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