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ADVANCE: Armed services trauma rehabilitation outcome study

Submission date
13/11/2019

Recruitment status
No longer recruiting

Registration date
18/11/2019

Overall study status
Ongoing

Last Edited
25/09/2025

Condition category
Injury, Occupational Diseases, Poisoning

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[ ] Record updated in last year

Plain English summary of protocol

Background and study aims
The purpose of the study is to investigate the long-term outcomes of battlefield trauma casualties and to compare these outcomes to those of a similar group of non-battlefield trauma individuals
The outcomes being investigated include medical (in particular cardiovascular disease and osteoarthritis) and psychosocial outcomes. There is some evidence to suggest that battlefield trauma casualties may have some unfavourable outcomes but this evidence is limited. Also, the types of injuries sustained in previous conflicts are different from those sustained in recent conflicts and therefore it is still unclear whether or how the type of injuries we are seeing from Afghanistan and Iraq will affect the long-term outcome of injured servicemen.
It is important to investigate these different medical and psychosocial outcomes so we can, where possible, support the injured individuals but also to learn from these outcomes and try and prevent any adverse outcomes in future injured servicemen.

Who can participate?
1,200 men will be recruited at baseline and will consist of: 600 UK male armed forces personnel who sustained physical battlefield trauma, while on deployment, requiring aeromedical evacuation and direct UK hospital admission during 2003 or after (Exposed Group): and 600 men matched for age, sex, service, rank, deployment and combat role (Non-exposed group).

What does the study involve?
At the baseline visit and at subsequent visits over 20 years the following tests and investigations will be performed on all 1,200 participants:
Questionnaires, including details on demographic details, personal and family medical history, mental health, quality of life, sleep, relationship & sexual function, employment status, social outcomes, mobility, disability, function and pain.
Imaging – DEXA scan to measure body composition and bone mineral density. X-rays of hips and knees are assessed for evidence of osteoarthritis. Brain Magnetic resonance imaging (MRI) is used to investigate the prevalence and impacts of traumatic brain injury (TBI).
Blood and urine sampling – some routine tests of blood fats and sugars, hormones, full blood count, kidney & liver function, and inflammation markers. Some samples are stored for later analyses.

Spirometry is used to assess respiratory function.
Other investigations include tests called pulse wave velocity and heart rate variability, which assess artery stiffness and are used to measure cardiovascular health.
Other than mild discomfort in having a blood test, all investigations are non-invasive and do not cause any discomfort.

What are the possible benefits and risks of participating?
The results of the study are primarily designed to benefit battlefield trauma casualties of the future. However, the extra medical assessments received during the study are in some cases, above and beyond what would be received as standard clinical care in the military or the NHS. Any clinically significant medical issues/abnormalities detected are reported back to the participant's GP or hospital specialist.
There is some exposure to radiation throughout the lifetime of the study for participants from the X-rays and DEXA scans, equivalent to 2.5 mSv, which is equivalent to that from approximately 13 months of exposure to natural background radiation, based on the UK average

Where is the study run from?
The study is run from the Defence Medical Rehabilitation Centre (DMRC), Stanford Hall, Loughborough, Leicestershire, UK

When is the study starting and how long is it expected to run for?
Baseline recruitment August 2015 to March 2020 and the study is expected to continue for 20 years of follow-up

Who is funding the study?
Government funding from LIBOR funds and charitable funding from Help for Heroes, Headley Court Charity, The Nuffield Trust, Blesma, Forces in Mind Trust, and the Office for Veteran's Affairs. The UK Ministry of Defence contributes ‘in kind’

Who is the main contact?
Group Captain Alex Bennett
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Contact information

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Additional identifiers

Protocol serial number
357/PPE/12

Study information

Scientific Title
Longitudinal cohort study to investigate long-term medical and psychosocial outcomes of physical battlefield trauma casualties

Acronym
ADVANCE

Study objectives
The aim is to investigate the long-term cardiovascular, musculoskeletal and other health and psychosocial outcomes of UK armed services physical battlefield trauma patients

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 07/07/2008, Ministry of Defence Research Ethics Committee (MoDREC) (MODREC Secretariat, Bldg 005, G02, Dstl Porton Down, Salisbury, Wiltshire, SP4 0JQ; MODREC@dstl.gov.uk; +44 (0)1980 956351), ref: Protocol No: 357/PPE/12

Primary study design
Observational

Study design
Prospective cohort study

Study type(s)

Quality of life

Health condition(s) or problem(s) studied
Military battlefield trauma

Interventions
Current interventions as of 08/04/2025:
UK Armed Services personnel will be recruited (equal numbers of 'exposed' and 'controls', frequency matched for age, sex, service, rank, deployment and combat role). The 'exposed' group sustained physical battlefield trauma, while on deployment in Afghanistan or Iraq, requiring aeromedical evacuation and direct UK hospital admission in or after 2003. A ‘control' group are selected from uninjured servicemen after frequency matching for age, service, rank, date of deployment and combat role. Those who agree to participate are invited to attend health screening investigations at baseline, and at regular intervals after for 20 years.

Previous interventions:
UK Armed Services personnel will be recruited (equal numbers of 'exposed' and 'controls', frequency matched for age, sex, service, rank, deployment and combat role). The 'exposed' group sustained physical battlefield trauma, while on deployment in Afghanistan or Iraq, requiring aeromedical evacuation and direct UK hospital admission in or after 2003. A ‘control' group are selected from uninjured servicemen after frequency matching for age, service, rank, date of deployment and combat role. Those who agree to participate are invited to attend health screening investigations at baseline, and after 3, 5, 10, 15 and 20 years.

Clinical Investigations performed (baseline):
1. Patient demographics:
1.1. Age
1.2. Sex
1.3. Regiment/unit
1.4. Job/role
1.5. Prosthetic components
2. All injuries documented
3. Date of injury/trauma
4. Injury severity score (Baker & O'Neill, 1976; Baker, O'Neill et al, 1974)
5. All subsequent trauma, requiring hospital admission, subsequent to commencing the study.
6. Past medical history
7. Smoking history
8. Drug History – prescribed and recreational
9. Method of discharge from Armed Services:
10. Blood tests:
10.1. Fasting lipids, glucose and HbA1c
10.2. Full blood count, urea and electrolytes and liver function and gamma GT.
10.3. hsCRP
10.4. HLA-B27
10.5. Serum and whole blood/plasma to be stored
11. Measurements and Imaging:
11.1. Pulse wave velocity assessment
11.2. DEXA- body composition and bone mineral density
11.3. Radiographs hips and knees
11.4. 6-minute walk test
11.5. BMI, abdominal circumference

11.6. BP and heart rate
11.7. SIGAM mobility grade
11.8. Spirometry (FEV1 and FVC)
11.9. Current medication
11.10. New fracture history
12. Questionnaires:
12.1. Amputee Mobility Predictor Questionnaire (AMPQ)
12.2. Prosthetic satisfaction (Numerical rating scale-NRS)
12.3. Prosthetic use questionnaire
12.4. Numerical rating scale- Back pain (frequency/intensity/impact)
12.5. Numerical rating scales- stump pain (frequency/intensity/impact)
12.6. Numerical rating scales- phantom pain (frequency/intensity /impact)
12.7. Oswestry disability index
12.8. Non arthritic hip score
12.9. Knee osteoarthritis outcomes score
12.10. Disability of the arm, shoulder and hand questionnaire
12.11. Pain manikin
12.12. European Quality of Life 5 Domains
12.13 Post traumatic stress disorder check list
12.14 Arizona Sexual Experience Scale (ASEX)
12.15. Alcohol use disorder identification test
12.16. Patient Health Questionnaire 9
12.17. Generalized Anxiety and Depression Score-7 (GAD 7)
12.18. Employment history

Intervention Type
Other

Primary outcome(s)
1. Cardiovascular risk - as determined by pulse wave velocity at 20 years
2. Major Adverse Cardiovascular Endpoint (MACE) - Composite Cardiovascular Disease (CVD) endpoint of cardiovascular death, non-fatal myocardial infarction, stroke, transient ischaemic attack (TIA), arterial revascularization (coronary artery bypass grafting, percutaneous coronary intervention, carotid endarterectomy or stenting and peripheral arterial stenting or bypass) at 20 years
3. Osteoarthritis of the hip and knee - as determined by patient-reported outcomes and radiographic assessment at 20 years

Key secondary outcome(s)
Updated 08/04/2025: Measured at baseline and at regular intervals after for 20 years (previously at baseline, and after 3, 5, 10, 15 and 20 years):
1. Cardiovascular risk as determined by more traditional cardiovascular risk factors (e.g., blood pressure and diagnosis of hypertension, lipid profile, blood glucose/diabetes mellitus, smoking history, hsCRP and abdominal waist circumference)
2. Cardiovascular disease as determined by individual components of the primary composite CVD score and peripheral vascular disease and other CAD (angina).
3. Musculoskeletal disease (osteoarthritis and osteoporosis),
4. All-cause mortality
5. Pain - back and stump/phantom (if applicable)

6. Mental health
7. Psychosocial/QoL/occupational/other outcomes
8. Functional status

Completion date
31/12/2040

Eligibility

Key inclusion criteria
Exposed Group:
1. UK Armed services personnel
2. Male
3. Sustained physical battlefield trauma, while on deployment in Operation Herrick (Afghanistan), requiring aeromedical evacuation and direct UK hospital admission
4. Injured during 2003 or after

Non-Exposed Group:
1. UK Armed services personnel
2. Male
3. Previously deployed
4. No battlefield trauma, as defined in the inclusion criteria

Participant type(s)
Healthy volunteer

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 Years

Upper age limit
50 Years

Sex
Male

Total final enrolment
1145

Key exclusion criteria
1. Unwilling or unable to give informed consent
2. Established CVD (previous stroke or transient ischaemic attack [TIA], ischaemic heart disease [IHD], peripheral vascular disease)
3. Past medical history of diabetes
4. Past medical history of renal or liver disease

5. Aged <18 and >50 years
6. Active acute infection with systemic features of sepsis, at the time of first visit, as defined below. Potential participant with active acute infection will be considered for recruitment once the acute illness is treated and resolved
7. Two of three of:
7.1. Temperature >38ºC or <36ºC
7.2. Heart rate >90 beats/min
7.3. Respiratory rate >20 breaths/min

Date of first enrolment
05/08/2015

Date of final enrolment
31/10/2020

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
Academic Department for Military Rehabilitation (ADMR)
Defence Medical Rehabilitation Centre (DMRC)
Stanford Hall
Nottingham
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LE12 5BL

Sponsor information

Organisation
Defence Medical Services, MoD

ROR
https://ror.org/01bvxzn29

Funder(s)

Funder type
Government

Funder Name
HM Treasury - LIBOR award

Funder Name
Help For Heroes

Funder Name
Headley Court Charity

Funder Name
The Nuffield Trust

Funder Name
Blesma

Funder Name
Forces in Mind Trust

Funder Name
Office for Veteran's Affairs

Funder Name
Ministry of Defence (UK)

Results and Publications

Individual participant data (IPD) sharing plan
The current data sharing plans for this study are unknown and will be available at a later date

IPD sharing plan summary
Data sharing statement to be made available at a later date

Study outputs

	Date	Date	Peer	Patient-

Output type	Details	created	added	reviewed?	facing?
Interim results article		20/06/2022	20/06/2022	Yes	No
Interim results article		24/09/2025	25/09/2025	Yes	No
Other publications	Pain after combat injury in male UK military personnel deployed to Afghanistan	22/03/2024	25/03/2024	Yes	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes
Study website	Study website	11/11/2025	11/11/2025	No	Yes