defined PTSD IRR 3.3 (95% CI 1.8–6.0), major depression 2.1 (1.3–3.5) and alcohol disorder 1.8 (1.0–3.3) at Wave 1. The adjusted IRR of incident CIDI-defined PTSD 3.7 (2.2–6.3) major depression 2.0 (1.2–3.2) and AUD 2.1 (1.1–3.8) at Wave 2 were increased for those with, compared to those without, MSI at Wave 1.

Conclusions Longitudinally, psychological disorders, in particular PTSD and depression, were found to be a risk factor for the development of MSI and the presence of MSI was a risk factor for the development of psychological disorders, in particular PTSD and depression. These findings have important implications for clinical and occupational health practice, service provision and longer term health in military and veteran populations.

05C.3 THE MENTAL HEALTH IMPACT OF DEPLOYMENT TO IRAQ AND AFGHANISTAN: WHAT DOES THE CURRENT DATA SHOW?

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The longer term mental health outcomes of UK serving and ex-serving personnel have been the subject of much speculation. The latest research findings from the third phase of a longitudinal study will be presented, which is the only military cohort study of its kind in the UK. Data was collected among 8093 personnel between 2014 and 2016. The study examined the prevalence of mental disorders and alcohol misuse, whether rates differed between serving and ex-serving regular personnel and the impact of various deployment exposures. The prevalence of probable posttraumatic stress disorder was 6.2% (95% confidence interval (CI) 5.5–6.9), 21.9% (95% CI 20.8–23.0) for common mental disorders and 10.0% (95% CI 9.2–10.9) for alcohol misuse. Deployment to Iraq or Afghanistan and self-reported role during deployment were associated with significantly worse mental health outcomes and alcohol misuse in ex-serving regular personnel but not in currently serving regular personnel. There was no association with number of deployments for any outcome. The findings highlight the importance of the continued monitoring of following personnel throughout their military career and beyond. The implications of the study outcomes will be discussed in the light of the mental health provision for serving and ex-serving personnel.

05C.4 THE ARMED SERVICES TRAUMA REHABILITATION OUTCOME STUDY (ADVANCE): A COHORT STUDY OF PHYSICAL BATTLEFIELD TRAUMA CASUALTIES

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The recent Iraq and Afghanistan conflicts represent a unique time in UK battlefield medicine; with more service personnel surviving complex traumas than any previous time. During these recent conflicts, approximately 830 UK service personnel were very seriously or seriously injured, and over 9000 were aero-medically evacuated. Little is known about the long-term health of these injured personnel. The Armed Services Trauma Rehabilitation Outcome Study (ADVANCE) is a longitudinal cohort study investigating the long-term medical and psychosocial outcomes of physical battlefield trauma casualties. 1200 male subjects who deployed to Afghanistan (600 injured and 600 non-injured individuals' frequency-matched by age, rank, service and role-in-theatre) will be followed up over a 20 year period. Primary objectives are to assess cardiovascular risk, cardiovascular events and osteoarthritis of the hip and knee. Secondary objectives are: musculoskeletal disease; pain; mental health; employment outcomes; functional status; quality of life; relationship status; sexual functioning; lung function; hearing loss and all-cause mortality. Data collection started in August 2015 and 705 participants have been recruited (376 non-injured and 329 injured). Most common injuries include single leg amputation, bilateral leg amputation (below knee), genital injuries and shrapnel injuries. Approximately 83% of participants are from the Army, 14% from Naval Services (including Royal Marines) and 3% from the Royal Air Force. The sample overall is comprised of approximately 14% Officers – with the other 86% holding lower ranks. Median age of the sample is 33 years at point of recruitment. Baseline data collection is due to be completed by the end of 2019, when follow data collection will commence. There are no other studies of this type currently being conducted and the results will have far reaching implications for the military and veteran community but also for members of the general population who have experienced a severe physical trauma.

05C.5 SARIN EXPOSURES IN A COHORT OF BRITISH MILITARY PARTICIPANTS IN HUMAN EXPERIMENTAL RESEARCH AT PORTON DOWN 1945–1987

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Background The effects of exposure to chemical warfare agents in humans are topical. Porton Down, near Salisbury, is the UK's centre for research on chemical warfare. Since WWI, a programme of experiments involving approximately 30 000 participants drawn from the UK armed services has been undertaken there.

Objectives Our aim is to report on exposures to nerve agents, particularly sarin, using detailed exposure data in a cohort of servicemen who attended Porton Down.

Methods We have used existing data on exposures to UK servicemen who attended the human volunteer programme at Porton Down to examine exposures to nerve agents in general and to sarin in particular.

Results Six principal nerve agents were tested on humans, all between 1945 and 1987. Of the 4299 nerve agent tests recorded, 3511 (82%) were with sarin, most commonly in an exposure chamber, with inhalation being the commonest

exposure route (85%). Biological response to sarin exposure was expressed as percentage change in cholinesterase activity and, less commonly, change in pupil size. For inhalation tests, assessed by changes in red blood cell cholinesterase median inhibition for was 41% (IQR 24%–51%), with a maximum of 87%. For dermal exposures, assessed by changes in unspecified cholinesterase, median inhibition was 22% (IQR 10%–37%), with a maximum inhibition of 99%. There was a clear association between increasing exposure to sarin and depression of cholinesterase activity but the strength of the association varied by exposure route and the presence of chemical or physical protection. Pupil size decreased with increased exposure but this relationship was less apparent when protection was present.

Conclusions These results, drawn from high quality experimental data, offer a unique insight into the effects of these chemical agents on humans.

Acknowledgement We thank Nicola Fear and Gemma Archer, our collaborators in new work on these data, for their input.

05C.6 THE HEALTH AND WELLBEING OF NEW ZEALAND VETERANS

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The psychological and physical health and wellbeing of New Zealand contemporary veterans

Background For New Zealand veterans, operational service and transition to civilian life are critical life events. Most veterans do well, but a significant minority fare poorly. Adverse outcomes are associated with post-traumatic stress disorder, PTSD, and also the development of minor but multiple health complaints, 'multiple symptom illness' (MSI).

Aim This project investigates factors associated with both wellbeing and ill health in NZ veterans, with the aim of developing a parsimonious instrument to detect 'at risk' veterans prior to, or at, transition.

Methods An on-line cross-sectional survey.

Wellbeing is measured by the EQ-5D, a health-related quality of life instrument assessing mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The adverse outcome is PTSD, identified using the PCL-M, an instrument reflecting DSM-IV PTSD symptoms.

Risk factors include MSI conforming to the Centers for Disease Control definition as 'the presence, for at least six months, of one or more chronic symptoms from at least two of three categories, namely fatigue, mood-cognition and musculoskeletal symptoms'. The General Health Questionnaire-28 (GHQ-28) screens for emotional distress and possible psychiatric morbidity. The Brief Trauma Questionnaire (BTQ), a 10-item self-report questionnaire derived from the Brief Trauma Interview, assesses the role of stressors contributing to PTSD.

Protective factors include the 24-item Social Provisions Scale (SPS) assessing social relationships and various dimensions of social support.

Analysis Logistic regression will identify the model of best fit for PTSD (PCL-M) and wellbeing (EQ-5D) respectively.

For MSI, a factor analysis will describe the pattern of symptom reporting. If this matches international experience, 3 factors will explain the majority of the variance in the data.

Results As at the 14th Nov 2018 we have 1592 completed questionnaires. Analysis will commence in mid-November 2018.

Exposure Assessment-2

05D.1 ABSTRACT WITHDRAWN

05D.2 OCCUPATIONAL EXPOSURE OF HEALTHCARE PERSONNEL TO NITROUS OXIDE IN VARIOUS PEDIATRIC SPECIALTY CARE UNITS: AN OBSERVATIONAL STUDY

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Objectives Nitrous oxide (N₂O) present in anesthetic mixtures (e.g., equimolar mix of oxygen and N₂O, EMONO) has been found responsible for various toxicities, including genetic and reproductive toxicities. N₂O-containing mixtures are widely used in pediatric care units where most healthcare providers (HCPs) are women of childbearing age. This motivated an investigation of occupational exposure to N₂O in search for overexposure and overexposure factors in a pediatric hospital.

Methods This observational study concerned seven different units. On each of 34 HCPs, air samples were extracted by portable pumps and collected in Tedlar® bags. N₂O was quantified by gas chromatography coupled to pulsed discharge ionization detection and infrared spectrometry. The data allowed calculating mainly the instantaneous exposure and the 8 hour time-weighted average (8h-TWA).

Results The exposure was four times higher in closed than in open treatment rooms and two times higher in case of use vs. non-use of EMONO. The exposure was significantly higher in junior vs. senior HCPs (by 12%) and higher during presumably short vs. presumably long procedures (by 20%). The mean 8h-TWAs were rather higher than the recommended exposure limit (25 ppm/8 hour) in emergency unit and in day hospital for thoracic and abdominal diseases. Overexposures represented 11% of all measurements but reached substantial levels (up to 3.5 times the recommended threshold).

Conclusions Overexposures to N₂O were frequent during short-duration procedures. The causes of overexposure were insufficient air renewal and inappropriate equipment use. This calls for dedicated rooms, more efficient medical/nursing practices, proper training, and regular checks of gas levels.