Diagnoses and factors associated with medical evacuation and return to duty for service members participating in Operation Iraqi Freedom or Operation Enduring Freedom: a prospective cohort study

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Summary

Background Anticipation of the types of injuries that occur in modern warfare is essential to plan operations and maintain a healthy military. We aimed to identify the diagnoses that result in most medical evacuations, and ascertain which demographic and clinical variables were associated with return to duty.

Methods Demographic and clinical data were prospectively obtained for US military personnel who had been medically evacuated from Operation Iraqi Freedom or Operation Enduring Freedom (January, 2004–December, 2007). Diagnoses were categorised post hoc according to the International Classification of Diseases codes that were recorded at the time of transfer. The primary outcome measure was return to duty within 2 weeks.

Findings 34 006 personnel were medically evacuated, of whom 89% were men, 91% were enlisted, 82% were in the army, and 86% sustained an injury in Iraq. The most common reasons for medical evacuation were: musculoskeletal and connective tissue disorders (n=8104 service members, 24%), combat injuries (n=4713, 14%), neurological disorders (n=3502, 10%), psychiatric diagnoses (n=3108, 9%), and spinal pain (n=2445, 7%). The factors most strongly associated with return to duty were being a senior officer (adjusted OR 2·01, 95% CI 1·71–2·35, p<0·0001), having a non-battle-related injury or disease (3·18, 2·77–3·67, p<0·0001), and presenting with chest or abdominal pain (2·48, 1·61–3·81, p<0·0001), a gastrointestinal disorder (non-surgical 2·32, 1·51–3·56, p=0·0001; surgical 2·62, 1·69–4·06, p<0·0001), or a genitourinary disorder (2·19, 1·43–3·36, p=0·0003). Covariates associated with a decreased probability of return to duty were serving in the navy or coast guard (0·59, 0·45–0·78, p=0·0002), or marines (0·86, 0·77–0·96, p=0·0083); and presenting with a combat injury (0·27, 0·17–0·44, p<0·0001), a psychiatric disorder (0·28, 0·18–0·43, p<0·0001), musculoskeletal or connective tissue disorder (0·46, 0·30–0·71, p=0·0004), spinal pain (0·41, 0·26–0·63, p=0·0001), or other wound (0·54, 0·34–0·84, p=0·0069).

Interpretation Implementation of preventive measures for service members who are at highest risk of evacuation, forward-deployed treatment, and therapeutic interventions could reduce the effect of non-battle-related injuries and disease on military readiness.

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Introduction

The primary mission of the military medical corps is to preserve the fighting force. During war, the components of this mission include treatment and rehabilitation of war injuries and non-battle-related injuries, and prevention of disease and injury. To best accomplish this mission, medical officers need to anticipate and recognise the most common medical disorders.

War is a dynamic, high-stakes endeavour consisting of strategy, logistics, operations, and personnel. This inherent complexity and constant flux make prediction of future developments difficult. Yet, as technology evolves, and the objectives of war shift from destruction and occupation to nation building and cultural engagement, unmistakeable trends have begun to emerge. For example, we have seen a linear increase over time in the wounded-in-action to killed-in-action ratio of service members who have been injured in combat, which has led to an increased emphasis on rehabilitation. But perhaps the most striking development has been the shift in the type of injuries necessitating medical evacuation from infectious and respiratory diseases and gastrointestinal disorders to non-battle-related injuries, which consist predominantly of spinal and other musculoskeletal disorders incurred during training or recreation.[1–3]

Former US Army Surgeon General, James Peake, called non-battle-related injuries "the hidden epidemic"[4] plaguing modern armies, which suggests that prevention of such injuries, and control of associated pain, has a pivotal role in preservation of unit readiness. The burden is not likely to recede anytime soon. In epidemiological studies done in pain treatment centres of levels III

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(combat support hospital) and IV (military treatment facility in non-combat area), low-back pain was reported as the leading cause of doctor visits and medical evacuation.[5,6] To achieve optimum use of medical resources and effectively plan military operations, medical and logistics officers need to be able to predict the major causes of unit attrition. Therefore, we undertook an epidemiological study to identify the leading diagnoses resulting in medical evacuation from Operation Iraqi Freedom and Operation Enduring Freedom, and to ascertain which variables were associated with return of a service member to duty with their unit.

Methods

Study design

In 2008, we obtained lists of service members who were medically evacuated out of forward-deployed units in Operation Iraqi Freedom or Operation Enduring Freedom (January, 2004–December, 2007) from a database prospectively maintained by the Deployed Warrior Medical Management Center in Landstuhl, Germany. This database is estimated to contain demographic, clinical, and military-relevant information for more than 98% of evacuated personnel: rank; date of evacuation; diagnosis at the time of transfer based on International Classification of Diseases, ninth revision, clinical modification (ICD-9-CM) codes; whether or not the injury occurred during a combat mission; deployment location (ie, Operation Iraqi Freedom, Operation Enduring Freedom, or other); and disposition (ie, return to duty or transfer to a military treatment facility in the continental USA for further treatment). Permission for this study was granted by the Department of Clinical Investigation at the Walter Reed Army Medical Center, Washington, DC, USA.

Every service member's diagnosis was coded by a single ICD-9-CM code, which was conferred by a physician at the evacuation site on the basis of the primary reason for medical care. Thus, service members with more than one diagnosis were coded only by their primary diagnosis. Classification into disease category was based on the ICD-9-CM disease and injury tabular index, which organises all diagnostic codes into 17 classifications and two supplementary groupings.[7] To customise the organisational scheme to show service members' pathology, several categories were either combined (eg, pregnancy and neonatal) or separated (eg, spinal *vs* musculoskeletal disorders; surgical *vs* non-surgical gastrointestinal disorders). Physicians stratified service members into categories of battle and non-battle-related injuries. All battle injuries were incurred during combat missions, but were not necessarily caused by enemy fire (eg, some back pain and overuse injuries). The main outcome measure, return to duty, was designated by the case manager at the Deployed Warrior Medical Management Center after an assessment and treatment of up to 2 weeks; treatment could be longer for non-battle-related injuries. Service members who returned to units deployed in support of Operation Iraqi Freedom or Operation Enduring Freedom were designated as returned to duty. Those who were sent either to a level IV military treatment

	2004			2005			2006			2007			Total		
	Deployed	Evacuated	RTD	Deployed	Evacuated	RTD	Deployed	Evacuated	RTD	Deployed	Evacuated	RTD	Deployed	Evacuated	RTD
Operation Iraqi Freedom															
Army	123 959	7482 (6%)	1562 (21%)	139 989	6120 (4%)	1530 (25%)	103 393	4438 (4%)	1039 (23%)	125 964	5910 (5%)	1055 (18%)	493 305	23 950 (5%)	5186 (22%)
Navy or coast guard	324	123 (38%)	13 (11%)	2524	130 (5%)	23 (18%)	3701	79 (2%)	23 (29%)	3833	91 (2%)	10 (11%)	10 382	423 (4%)	69 (16%)
Air force	1245	335 (27%)	121 (36%)	1854	233 (13%)	74 (32%)	10 337	281 (3%)	85 (30%)	10 598	304 (3%)	88 (29%)	24 034	1153 (5%)	368 (32%)
Marines	24 293	1317 (5%)	133 (10%)	22 440	963 (4%)	111 (12%)	24 338	844 (3%)	117 (14%)	22 790	657 (3%)	87 (13%)	93 861	3781 (4%)	448 (12%)
Total	149 821	9257 (6%)	1829 (20%)	166 807	7446 (4%)	1738 (23%)	141 769	5642 (4%)	1264 (22%)	163 185	6962 (4%)	1240 (18%)	621 582	29 307 (5%)	6071 (21%)
Operation Enduring Freedom															
Army	13 696	858 (6%)	277 (32%)	15 210	878 (6%)	391 (45%)	20 945	1012 (5%)	403 (40%)	19 563	1274 (7%)	336 (26%)	69 414	4022 (6%)	1407 (35%)
Navy or coast guard	86	11 (13%)	2 (18%)	246	7 (3%)	1 (14%)	479	12 (3%)	3 (25%)	839	23 (3%)	4 (17%)	1650	53 (3%)	10 (19%)
Air force	165	82 (50%)	30 (37%)	309	108 (35%)	48 (44%)	3629	81 (2%)	22 (27%)	3795	147 (4%)	53 (36%)	7898	418 (5%)	153 (37%)
Marines	4178	82 (2%)	9 (11%)	1078	55 (5%)	13 (24%)	113	31 (27%)	4 (13%)	196	38 (19%)	8 (21%)	5565	206 (4%)	34 (17%)
Total	18 125	1033 (6%)	318 (31%)	16 843	1048 (6%)	453 (43%)	25 166	1136 (5%)	432 (38%)	24 393	1482 (6%)	401 (27%)	84 527	4699 (6%)	1604 (34%)

Data are number, number evacuated (% of deployed), or number RTD (% of evacuated).

Table 1: **Service members who were deployed, medically evacuated, and returned to duty (RTD) by year, military operation, and service branch**

facility in the USA for further assessment or treatment, or to their home unit outside of a designated combat zone, were classified as not returned to duty. A preliminary review of more than 3000 medical records showed that about 1% of evacuated service members return to duty in Iraq or Afghanistan after subsequent treatment at level IV treatment centres in the USA, and less than 1% of diagnostic categories were incorrect (eg, incorrect coding of a psychiatric disorder as back pain).

Statistical analysis

The primary outcome measure in this cohort study was return to duty after injury. Clinical and demographic characteristics were assessed with measures of central tendency. Statistical analyses were done with Stata MP (version 10.1). We assessed statistical significance using *t* tests for age, and Pearson's χ^2 and Fisher's exact tests for categorical variables. A p value of less than 0·05 was deemed to be significant. To test our hypotheses,

	2004 (n=10 290)		2005 (n=8494)		2006 (n=6778)		2007 (n=8444)	
	OIF (n=9257)	OEF (n=1033)	OIF (n=7446)	OEF (n=1048)	OIF (n=5642)	OEF (n=1136)	OIF (n=6962)	OEF (n=1482)
Age (years)*	30·2 (9·4)	31·4 (9·4)	30·3 (9·2)	30·8 (9·4)	29·0 (8·7)	31·2 (9·5)	28·6 (8·4)	30·7 (9·3)
Sex								
Men	8323 (90%)	920 (89%)	6656 (89%)	921 (88%)	4958 (88%)	973 (86%)	6121 (88%)	1310 (88%)
Women	933 (10%)	113 (11%)	790 (11%)	127 (12%)	684 (12%)	163 (14%)	841 (12%)	172 (12%)
Unknown	1 (<1%)	0	0	0	0	0	0	0
Commission or rank†								
Junior enlisted	4468 (48%)	417 (40%)	3656 (49%)	464 (44%)	2946 (52%)	504 (44%)	3891 (56%)	686 (46%)
Senior enlisted	4031 (44%)	483 (47%)	3109 (42%)	442 (42%)	2198 (39%)	478 (42%)	2428 (35%)	590 (40%)
Junior officer	519 (6%)	76 (7%)	477 (6%)	78 (7%)	354 (6%)	84 (7%)	439 (6%)	130 (9%)
Senior officer	239 (3%)	57 (6%)	204 (3%)	64 (6%)	144 (3%)	70 (6%)	204 (3%)	76 (5%)
Service affiliation								
Army	7482 (81%)	858 (83%)	6120 (82%)	878 (84%)	4438 (79%)	1012 (89%)	5910 (85%)	1274 (86%)
Navy or coast guard	123 (1%)	11 (1%)	130 (2%)	7 (1%)	79 (1%)	12 (1%)	91 (1%)	23 (2%)
Air force	335 (4%)	82 (8%)	233 (3%)	108 (10%)	281 (5%)	81 (7%)	304 (4%)	147 (10%)
Marines	1317 (14%)	82 (8%)	963 (13%)	55 (5%)	844 (15%)	31 (3%)	657 (9%)	38 (3%)
Component								
Active duty	5188 (56%)	541 (52%)	4052 (54%)	610 (58%)	4086 (72%)	632 (56%)	5383 (77%)	1010 (68%)
Reserve or national guard	4069 (44%)	492 (48%)	3394 (46%)	438 (42%)	1556 (28%)	504 (44%)	1579 (23%)	472 (32%)
Nature of injury								
Battle	2238 (24%)	100 (10%)	1675 (22%)	96 (9%)	1462 (26%)	174 (15%)	1929 (28%)	285 (19%)
Non-battle-related or disease	7019 (76%)	933 (90%)	5771 (78%)	952 (91%)	4180 (74%)	962 (85%)	5033 (72%)	1197 (81%)
Disposition								
Evacuation to US or home base	7428 (80%)	715 (69%)	5708 (77%)	595 (57%)	4378 (78%)	704 (62%)	5722 (82%)	1081 (73%)
Returned to duty	1829 (20%)	318 (31%)	1738 (23%)	453 (43%)	1264 (22%)	432 (38%)	1240 (18%)	401 (27%)

Data are mean (SD) or number (%). OIF=Operation Iraqi Freedom. OEF=Operation Enduring Freedom. *For OIF, data were supplied for 9177 service members in 2004, 7436 in 2005, 5623 in 2006, and 6935 in 2007; for OEF, data were supplied for 1029 service members in 2004 and 1047 in 2005, and all service members supplied data in 2006 and 2007. †Senior refers to field-grade officer and above (>04) for commissioned officers (eg, major for army, air force, and marines; lieutenant commander for navy), or non-commissioned officer (eg, sergeant for army and marines; petty officer 2nd class for navy) and above for enlisted personnel (>E5). Junior refers to lower-enlisted personnel or company-grade officer.

Table 2: **Baseline demographic characteristics of service members who were medically evacuated (n=34 006)**

	OIF *vs* OEF				OIF			OEF		
	2004	2005	2006	2007	2004 *vs* 2005	2005 *vs* 2006	2006 *vs* 2007	2004 *vs* 2005	2005 *vs* 2006	2006 *vs* 2007
Age	0·0001	0·0975	<0·0001	<0·0001	0·5380	<0·0001	0·0038	0·1522	0·2922	0·1995
Sex	0·4469	0·1406	0·0385	0·6102	0·3154	0·0067	0·9406	0·3997	0·1249	0·0373
Commission or rank	<0·0001	<0·0001	<0·0001	<0·0001	0·0367	0·0049	<0·0001	0·1995	0·9999	0·2553
Service affiliation	<0·0001	<0·0001	<0·0001	<0·0001	0·0034	<0·0001	<0·0001	0·0195	0·0005	0·0525
Component	0·0242	0·0210	<0·0001	<0·0001	0·0357	<0·0001	<0·0001	0·0074	0·2253	<0·0001
Nature of injury	<0·0001	<0·0001	<0·0001	<0·0001	0·0108	<0·0001	0·0239	0·6846	<0·0001	0·0090
Disposition	<0·0001	<0·0001	<0·0001	<0·0001	<0·0001	0·2062	<0·0001	<0·0001	0·0135	<0·0001

p values are based on data in table 2. OIF=Operation Iraqi Freedom. OEF=Operation Enduring Freedom.

Table 3: **Comparisons of baseline demographic characteristics of service members who were medically evacuated**

	2004 (n=10 290)		2005 (n=8494)		2006 (n=6778)		2007 (n=8444)	
	OIF (n=9257)	OEF (n=1033)	OIF (n=7446)	OEF (n=1048)	OIF (n=5642)	OEF (n=1136)	OIF (n=6962)	OEF (n=1482)
Blood	26 (<1%)	3 (<1%)	32 (<1%)	3 (<1%)	13 (<1%)	2 (<1%)	21 (<1%)	10 (1%)
Chest or abdominal pain	382 (4%)	55 (5%)	202 (3%)	69 (7%)	159 (3%)	49 (4%)	277 (4%)	66 (4%)
Circulatory	415 (4%)	64 (6%)	312 (4%)	69 (7%)	265 (5%)	72 (6%)	241 (3%)	83 (6%)
Combat	1578 (17%)	55 (5%)	1045 (14%)	48 (5%)	870 (15%)	77 (7%)	907 (13%)	133 (9%)
Congenital anomalies	53 (1%)	11 (1%)	35 (<1%)	4 (<1%)	28 (<1%)	5 (<1%)	35 (1%)	14 (1%)
Gastrointestinal (non-surgical)	386 (4%)	70 (7%)	301 (4%)	82 (8%)	206 (4%)	80 (7%)	278 (4%)	85 (6%)
Gastrointestinal (surgical)	520 (6%)	41 (4%)	136 (2%)	32 (3%)	63 (1%)	19 (2%)	89 (1%)	35 (2%)
Endocrine	162 (2%)	19 (2%)	123 (2%)	25 (2%)	89 (2%)	19 (2%)	95 (1%)	28 (2%)
Genitourinary	494 (5%)	63 (6%)	353 (5%)	57 (5%)	236 (4%)	116 (10%)	328 (5%)	119 (8%)
Infectious disease	291 (3%)	14 (1%)	104 (1%)	16 (2%)	46 (1%)	9 (1%)	46 (1%)	23 (2%)
Psychiatric	461 (5%)	66 (6%)	634 (9%)	64 (6%)	668 (12%)	51 (4%)	998 (14%)	166 (11%)
Musculoskeletal or connective tissue	2079 (22%)	272 (26%)	1973 (26%)	289 (28%)	1293 (23%)	289 (25%)	1594 (23%)	315 (21%)
Neoplasm	121 (1%)	8 (1%)	111 (1%)	22 (2%)	105 (2%)	15 (1%)	99 (1%)	16 (1%)
Neurological	841 (9%)	113 (11%)	677 (9%)	88 (8%)	578 (10%)	140 (12%)	888 (13%)	177 (12%)
Pregnancy or perinatal	47 (1%)	3 (<1%)	31 (<1%)	4 (<1%)	44 (1%)	3 (<1%)	48 (1%)	5 (<1%)
Respiratory	220 (2%)	28 (3%)	197 (3%)	35 (3%)	121 (2%)	24 (2%)	126 (2%)	35 (2%)
Skin	175 (2%)	17 (2%)	135 (2%)	21 (2%)	72 (1%)	20 (2%)	113 (2%)	21 (1%)
Spinal pain	528 (6%)	83 (8%)	624 (8%)	71 (7%)	504 (9%)	94 (8%)	442 (6%)	99 (7%)
Miscellaneous	172 (2%)	18 (2%)	149 (2%)	24 (2%)	120 (2%)	24 (2%)	155 (2%)	26 (2%)
Wound	306 (3%)	30 (3%)	272 (4%)	25 (2%)	162 (3%)	28 (2%)	182 (3%)	26 (2%)

Data are number (%). p<0·0001 for OIF *vs* OEF in 2004, 2005, 2006, and 2007. p<0·0001 for OIF 2004 *vs* 2005, 2005 *vs* 2006, and 2006 *vs* 2007. p=0·2606 for OEF 2004 *vs* 2005; and p<0·0001 for 2005 *vs* 2006, and 2006 *vs* 2007. OIF=Operation Iraqi Freedom. OEF=Operation Enduring Freedom.

Table 4: **Baseline injury classification of service members who were medically evacuated (n=34 006)**

univariate and multivariate regression models were developed, with odds ratios (ORs, 95% CI) adjusted for age, sex, and calendar year. All variables were included in the multivariate models simultaneously.

Role of the funding source

The sponsors of the study had no role in the study design, recruitment of participants, data collection, data analysis, data interpretation, writing of the report, or the decision to submit for publication. The corresponding author had full access to all the data and had final responsibility for the decision to submit for publication.

Results

The distribution of deployed service members by year, military operation, and service branch is shown in table 1. Across all years studied and both military operations, army personnel accounted for about 80% of deployed service members: nearly 500 000 in Operation Iraqi Freedom and more than 69 000 in Operation Enduring Freedom. Overall, 5% of service members deployed in Operation Iraqi Freedom were medically evacuated, of whom about a fifth returned to duty; and 6% of those in Operation Enduring Freedom were evacuated, of whom about a third returned to duty. In Operation Iraqi Freedom, the percentage of evacuated personnel was similar across service branches, but return to duty was highest in air force personnel and lowest in marines. In Operation Enduring Freedom, the percentages of evacuation and return to duty were highest in army and air force personnel; and return to duty was lowest in marines.

Of the 34 006 individuals who were evacuated from Operation Iraqi Freedom or Operation Enduring Freedom (2004–07), about 30% were evacuated in 2004, 25% in 2005, 20% in 2006, and 25% in 2007. Most of the evacuated personnel were men (n=30 182 service members; 89%), enlisted (n=30 791, 91%), in the army (n=27 972, 82%), and injured in Operation Iraqi Freedom (n=29 307, 86%), providing an indication of the composition and location of military forces (tables 2 and 3). Most wounded personnel were on active duty (n=21 502, 63%). Occurrence of battle-related injuries peaked in 2007, accounting for 26% of injuries that resulted in evacuation across both operations, whereas disease and non-battle-related injuries were most prevalent in 2005, accounting for 79% of injuries that resulted in evacuation. Overall, injuries that resulted in evacuation from Afghanistan linearly increased over the course of the study, whereas those sustained in Operation Iraqi Freedom were at their zenith in 2004 (table 2). During the 4 years studied, the mean age of individuals evacuated was higher for Operation Enduring Freedom than for Operation Iraqi Freedom, with significant differences in 2004, 2006, and 2007 (table 3). For every year during 2004–07, the commission or rank of those evacuated was significantly different between the operations; junior enlisted represented a higher proportion of evacuated service members in Operation Iraqi Freedom than in

Operation Enduring Freedom, whereas the proportion of senior officers evacuated was twice as high in Afghanistan than in Iraq (table 3). The proportion of active-duty service members who were evacuated steadily increased during the 4 years for Operation Iraqi Freedom, but only for 2004–05 and 2006–07 for Operation Enduring Freedom (table 3).

For 2004–05 overall, the five most common reasons for medical evacuation across both operations (n=10 290 in 2004, n=8494 in 2005; table 4) were: musculoskeletal and

	2004 (n=2147/10 290, 21%)		2005 (n=2191/8494, 26%)		2006 (n=1696/6778, 25%)		2007 (n=1641/8444, 19%)	
	OIF (n=1829/9257, 20%)	OEF (n=318/1033, 31%)	OIF (n=1738/7446, 23%)	OEF (n=453/1048, 43%)	OIF (n=1264/5642, 22%)	OEF (n=432/1136, 38%)	OIF (n=1240/6962, 18%)	OEF (n=401/1482, 27%)
Age (years)*	32·7 (10·3)	33·7 (10·2)	32·7 (9·8)	32·0 (9·8)	31·5 (9·7)	33·6 (10·2)	32·0 (9·9)	34·5 (10·0)
Sex								
Men	1542 (19%)	269 (29%)	1452 (22%)	387 (42%)	990 (20%)	338 (35%)	945 (15%)	320 (24%)
Women	287 (31%)	49 (43%)	286 (36%)	66 (52%)	274 (40%)	94 (58%)	295 (35%)	81 (47%)
Commission or rank†								
Junior enlisted	679 (15%)	102 (24%)	716 (20%)	182 (39%)	542 (18%)	167 (33%)	516 (13%)	128 (19%)
Senior enlisted	926 (23%)	162 (34%)	784 (25%)	198 (45%)	527 (24%)	195 (41%)	501 (21%)	185 (31%)
Junior officer	124 (24%)	32 (42%)	157 (33%)	33 (42%)	120 (34%)	35 (42%)	140 (32%)	51 (39%)
Senior officer	100 (42%)	22 (39%)	81 (40%)	40 (63%)	75 (52%)	35 (50%)	83 (41%)	37 (49%)
Service affiliation								
Army	1562 (21%)	277 (32%)	1530 (25%)	391 (45%)	1039 (23%)	403 (40%)	1055 (18%)	336 (26%)
Navy or coast guard	13 (11%)	2 (18%)	23 (18%)	1 (14%)	23 (29%)	3 (25%)	10 (11%)	4 (17%)
Air force	121 (36%)	30 (37%)	74 (32%)	48 (44%)	85 (30%)	22 (27%)	88 (29%)	53 (36%)
Marines	133 (10%)	9 (11%)	111 (12%)	13 (24%)	117 (14%)	4 (13%)	87 (13%)	8 (21%)
Service component								
Active duty	854 (16%)	144 (27%)	776 (19%)	255 (42%)	830 (20%)	166 (26%)	863 (16%)	231 (23%)
Reserve or national guard	975 (24%)	174 (35%)	962 (28%)	198 (45%)	434 (28%)	266 (53%)	377 (24%)	170 (36%)
Nature of injury								
Battle	101 (5%)	6 (6%)	66 (4%)	11 (11%)	60 (4%)	17 (10%)	73 (4%)	22 (8%)
Non-battle-related or disease	1728 (25%)	312 (33%)	1672 (29%)	442 (46%)	1204 (29%)	415 (43%)	1167 (23%)	379 (32%)
Injury classification								
Blood	7 (27%)	2 (67%)	13 (41%)	0	4 (31%)	1 (50%)	3 (14%)	3 (30%)
Chest or abdominal pain	186 (49%)	32 (58%)	114 (56%)	47 (68%)	86 (54%)	31 (63%)	119 (43%)	35 (53%)
Circulatory	152 (37%)	25 (39%)	103 (33%)	40 (58%)	113 (43%)	42 (58%)	84 (35%)	35 (42%)
Combat	45 (3%)	2 (4%)	26 (2%)	5 (10%)	24 (3%)	6 (8%)	22 (2%)	3 (2%)
Congenital anomalies	15 (28%)	4 (36%)	10 (29%)	1 (25%)	8 (29%)	1 (20%)	11 (31%)	3 (21%)
Gastrointestinal (non-surgical)	187 (48%)	42 (60%)	144 (48%)	57 (70%)	98 (48%)	57 (71%)	95 (34%)	52 (61%)
Gastrointestinal (surgical)	289 (56%)	24 (59%)	49 (36%)	11 (34%)	18 (29%)	9 (47%)	26 (29%)	15 (43%)
Endocrine	44 (27%)	3 (16%)	39 (32%)	10 (40%)	32 (36%)	4 (21%)	26 (27%)	12 (43%)
Genitourinary	206 (42%)	29 (46%)	169 (48%)	42 (74%)	144 (61%)	80 (69%)	145 (44%)	70 (59%)
Infectious disease	22 (8%)	6 (43%)	36 (35%)	7 (44%)	17 (37%)	6 (67%)	17 (37%)	6 (26%)
Psychiatric	31 (7%)	8 (12%)	97 (15%)	10 (16%)	59 (9%)	5 (10%)	69 (7%)	7 (4%)
Musculoskeletal or connective tissue	159 (8%)	51 (19%)	305 (15%)	88 (30%)	170 (13%)	56 (19%)	166 (10%)	46 (15%)
Neoplasm	50 (41%)	5 (63%)	50 (45%)	11 (50%)	48 (46%)	7 (47%)	42 (42%)	8 (50%)
Neurological	202 (24%)	40 (35%)	241 (36%)	45 (51%)	227 (39%)	63 (45%)	212 (24%)	55 (31%)
Pregnancy or perinatal	12 (26%)	0	10 (32%)	3 (75%)	10 (23%)	1 (33%)	9 (19%)	3 (60%)
Respiratory	48 (22%)	10 (36%)	66 (34%)	13 (37%)	38 (31%)	12 (50%)	31 (25%)	11 (31%)
Skin	54 (31%)	7 (41%)	54 (40%)	11 (52%)	27 (38%)	11 (55%)	35 (31%)	7 (33%)
Spinal pain	30 (6%)	6 (7%)	110 (18%)	25 (35%)	79 (16%)	24 (26%)	64 (14%)	16 (16%)
Miscellaneous	58 (34%)	9 (50%)	52 (35%)	15 (63%)	38 (32%)	10 (42%)	37 (24%)	10 (38%)
Wound	32 (10%)	13 (43%)	50 (18%)	12 (48%)	24 (15%)	6 (21%)	27 (15%)	4 (15%)

Data are mean (SD) or number (%); denominator for percentages is the number of service members in the relevant category at baseline from tables 2 and 4. OIF=Operation Iraqi Freedom. OEF=Operation Enduring Freedom. *For OIF, data were supplied for 1823 service members in 2004, 1736 in 2005, 1260 in 2006, and 1235 in 2007; for OEF, data were supplied for all service members in all years. †Senior refers to field-grade officer and above (>04) for commissioned officers (eg, major for army, air force, and marines; lieutenant commander for navy), or non-commissioned officer (eg, sergeant for army and marines; petty officer second class for navy) and above for enlisted personnel (>E5). Junior refers to lower-enlisted personnel or company-grade officer.

Table 5: **Demographic and clinical characteristics of service members who were medically evacuated and returned to duty (n=7675)**

	OIF *vs* OEF				OIF			OEF		
	2004	2005	2006	2007	2004 *vs* 2005	2005 *vs* 2006	2006 *vs* 2007	2004 *vs* 2005	2005 *vs* 2006	2006 *vs* 2007
Age	0·1289	0·2090	0·0003	<0·0001	0·8813	0·0015	0·2229	0·0255	0·0211	0·1902
Sex	0·8981	0·3302	0·9715	0·1369	0·5345	0·0003	0·2071	0·7474	0·0055	0·5808
Commission or rank	0·0743	0·0050	0·1519	0·0050	0·0010	0·1792	0·3900	0·0464	0·9051	0·0627
Service affiliation	0·0052	<0·0001	<0·0001	<0·0001	0·0028	0·0001	0·0236	0·7978	0·0017	0·0002
Service component	0·6419	<0·0001	<0·0001	<0·0001	0·2208	<0·0001	0·0355	0·0026	<0·0001	<0·0001
Nature of injury	0·0060	0·1587	0·4842	0·7651	0·0148	0·2003	0·2033	0·6142	0·2005	0·2897
Injury classification	0·0001	0·0032	0·0001	0·0004	<0·0001	0·0002	0·5573	0·0301	0·0127	0·7228

p values are based on data in table 5. OIF=Operation Iraqi Freedom. OEF=Operation Enduring Freedom.

Table 6: **Comparisons of demographic and clinical characteristics of service members who were medically evacuated and returned to duty**

connective tissue disorders (n=2351, 23% in 2004; n=2262, 27% in 2005), combat injuries (n=1633, 16% in 2004; n=1093, 13% in 2005), neurological disorders (n=954, 9% in 2004; n=765, 9% in 2005), spinal pain (n=611, 6% in 2004; n=695, 8% in 2005), and psychiatric diagnoses (n=527, 5% in 2004; n=698, 8% in 2005). In 2006, the most common reasons for evacuation were musculoskeletal and connective tissue disorders (n=1582, 23%), combat injuries (n=947, 14%), and psychiatric (n=719, 11%) and neurological disorders (n=718, 11%). By 2007, evacuations attributable to musculoskeletal disorders remained most prevalent (n=1909, 23%), and psychiatric (n=1164, 14%) and neurological (n=1065, 13%) disorders had surpassed combat injuries (n=1040, 12%) as reasons for medical evacuation (table 4).

With the exception of combat injuries and psychiatric disorders, the proportion of injuries stratified by ICD-9-CM category remained fairly stable during 2004–07 (table 4). Combat injuries sustained in Operation Iraqi Freedom peaked in 2004, whereas those incurred in Afghanistan tended to increase during 2004–07. By contrast, psychiatric indications for evacuation increased across both operations by 32·4% during 2004–05, 3·0% during 2005–06, and 61·9% during 2006–07. For Operation Iraqi Freedom, psychiatric diagnoses in evacuated service members increased by 37·5% during 2004–05, 5·4% during 2005–06, and 49·4% during 2006–07. Psychiatric diagnoses in Operation Enduring Freedom decreased by 3·0% during 2004–05 and 20·3% during 2005–06, but increased by 225·5% during 2006–07 (table 4).

Overall, about 79% (n=23 236/29 307) of injured or ill individuals from Operation Iraqi Freedom and 66% (n=3095/4699) of those from Operation Enduring Freedom, did not return to their unit (table 5). Across both operations, 79% (n=23 939/30 182) of men and 63% (n=2391/3823) of women did not return to their deployed unit. A similar breakdown was recorded for junior and senior personnel, and officers and enlisted personnel. In both cases, a greater proportion of high-ranking personnel returned to duty (table 5).

For the most part, demographic and clinical characteristics of service members who returned to duty remained stable during the 4 years studied, although some trends were noted (table 5). The mean age of service members who returned to duty peaked in 2004–05 for Operation Iraqi Freedom, but it peaked in 2007 for Operation Enduring Freedom. Significant differences were also noted for service affiliation between operations for every year of the study, between every successive year for Operation Iraqi Freedom, and between every successive year in Operation Enduring Freedom apart from 2004 versus 2005 (table 6). These differences were predominantly due to variations in return-to-duty rates for army personnel (ie, soldiers), who represented the bulk of medically evacuated service members; in both operations, return-to-duty rates decreased from a peak in 2005 to the lowest rates in 2007 (table 5). In reserve or national guard service members, return-to-duty rates were substantially higher for both operations in 2005–06 than in 2004 and 2007 (table 5).

With respect to individual disease categories, significant changes were recorded every year between operations, and between successive years for each operation apart from 2006 versus 2007 (table 6). Analysis of table 5 suggests some probable reasons for these differences. For example, in service members evacuated for psychiatric disorders, return-to-duty rates decreased from a peak in 2005 through to 2007 for both operations. With respect to infectious disease, the proportion of evacuated personnel from Operation Iraqi Freedom who returned to duty increased substantially from a low of 8% in 2004 to 37% in 2007, an effect partly attributable to the reduced occurrence of leishmaniasis infections in later years (data not shown).

Almost all service members with a battle injury (n=7603/7959, 96%) and most of those with a disease or non-battle-related injury (n=18 728/26 047, 72%) did not return to duty (table 5). The injuries or illnesses most frequently resulting in an inability to return to work were combat injuries (n=4580/4713, 97%), psychiatric disorders (n=2871/3108, 92%), musculoskeletal or connective tissue disorders (n=7036/8104, 87%), and spinal pain (n=2091/2445, 86%). Diagnoses that were most frequently associated with return to duty were chest or abdominal pain (n=650/1259, 52%), genitourinary disorders (n=885/1766, 50%), gastrointestinal disorders (n=732/1488, 49% for non-surgical; n=441/935, 47% for surgical), and neoplasms (n=221/497, 44%; table 5). For individuals with

traumatic brain injury, substance abuse, stress reaction, or depression or bipolar disorder, frequency of return to duty was low across all groups, ranging from 6% (mood disorders) to 14% (traumatic brain injury; data not shown). Notably, injuries or illnesses for which the default decision was not to return to duty (ie, musculoskeletal, combat, psychiatric, neurological, and spinal disorders) affected a higher proportion of people than did those that would usually allow return to duty; such a finding could have implications for future preventive interventions.

Univariate and multivariate estimates of the relation between clinical and demographic characteristics and the probability of return to duty are presented in table 7. In the univariate analysis, across the 4 years studied, increased age, female sex, and deployment in support of Operation Enduring Freedom were associated with a raised probability of a positive outcome. After adjustment for age, sex, and calendar year, the factors most strongly associated with return to duty were: being a senior officer; having a non-battle-related injury or disease; and presenting with chest or abdominal pain, a gastrointestinal disorder (non-surgical or surgical), or a genitourinary disorder. After adjustment, the covariates associated with a significantly decreased probability of return to duty were: serving in the navy, coast guard, or marines; having a combat injury; and presenting with a psychiatric disorder, musculoskeletal or connective tissue disorder, spinal pain, or other wound. Of the various psychiatric conditions, mood and stress disorders were the least likely to be associated with return to duty (table 8). In service members who were medically evacuated with a primary diagnosis of spinal pain, the presence of a comorbid psychiatric diagnosis decreased the probability of their return to duty by 38% (OR 0·62, 95% CI 0·43–0·89, p=0·0092, data not shown).

Discussion

Our large epidemiological study shows that disease and non-battle-related injuries are the primary causes of soldier attrition during wartime. The leading causes of medical evacuation from Operation Iraqi and Operation Enduring Freedom were musculoskeletal and connective tissue disorders, combat injuries, neurological disorders, psychiatric diagnoses, and spinal pain. Such data are important to logistics officers because they could contribute to advanced planning of operational support for strategic military initiatives.

For the 4 years analysed, we recorded remarkably consistent numbers of service members who were evacuated for each of the categorised medical disorders and who returned to duty. One exception to this finding was the sharp increase in the number of evacuated patients with psychiatric diagnoses. This rise occurred despite the introduction of mental health teams devoted to treating combat stress. Since the denominator for the absolute number of service members treated in each disease category at forward-deployed treatment facilities is unknown, evacuation rates cannot be calculated. However, estimates of the frequency of return to duty for psychiatric illnesses stratified by treatment location suggest that mental health teams have been very successful in retaining service members. Frequency of return to duty for service members with combat stress is about 95% in mental health clinics and 70% in combat support hospitals. By contrast, frequency of return to duty is 50% for service members treated for combat stress in Kuwait, 10% for those treated

	Unadjusted odds ratio (95% CI)	p value	Adjusted odds ratio (95% CI)*	p value
Age†	3·35 (3·10–3·63)	<0·0001	1·26 (1·12–1·42)	0·0002
Female sex	2·30 (2·14–2·47)	<0·0001	1·54 (1·42–1·68)	<0·0001
Commission or rank‡				
Senior enlisted	1·56 (1·48–1·65)	<0·0001	1·13 (1·05–1·22)	0·0007
Junior officer	2·18 (1·98–2·41)	<0·0001	1·60 (1·42–1·79)	<0·0001
Senior officer	3·73 (3·29–4·24)	<0·0001	2·01 (1·71–2·35)	<0·0001
Service affiliation				
Navy or coast guard	0·65 (0·51–0·82)	0·0004	0·59 (0·45–0·78)	0·0002
Air force	1·61 (1·44–1·79)	<0·0001	1·15 (1·02–1·30)	0·0204
Marines	0·45 (0·40–0·49)	<0·0001	0·86 (0·77–0·96)	0·0082
Reserve or national guard status	1·68 (1·59–1·77)	<0·0001	1·21 (1·13–1·28)	<0·0001
Operation Enduring Freedom	1·98 (1·86–2·12)	<0·0001	1·59 (1·47–1·71)	<0·0001
Non-battle-related injury or disease	8·35 (7·48–9·31)	<0·0001	3·19 (2·77–3·67)	<0·0001
Injury classification				
Chest or abdominal pain	2·49 (1·63–3·80)	<0·0001	2·48 (1·61–3·81)	<0·0001
Circulatory	1·50 (0·98–2·28)	0·0609	1·48 (0·96–2·27)	0·0762
Combat	0·07 (0·04–0·11)	<0·0001	0·27 (0·17–0·44)	<0·0001
Congenital anomalies	0·94 (0·56–1·57)	0·8050	1·05 (0·62–1·78)	0·8601
Gastrointestinal (non-surgical)	2·26 (1·48–3·44)	0·0001	2·32 (1·51–3·56)	0·0001
Gastrointestinal (surgical)	2·08 (1·36–3·19)	0·0008	2·62 (1·69–4·06)	<0·0001
Endocrine	1·02 (0·65–1·59)	0·9406	0·99 (0·63–1·55)	0·9514
Genitourinary	2·34 (1·54–3·56)	0·0001	2·19 (1·43–3·36)	0·0003
Infectious disease	0·63 (0·40–1·00)	0·0486	0·77 (0·48–1·23)	0·2741
Psychiatric	0·24 (0·15–0·36)	<0·0001	0·28 (0·18–0·43)	<0·0001
Musculoskeletal or connective tissue	0·34 (0·23–0·52)	<0·0001	0·46 (0·30–0·71)	0·0004
Neoplasm	1·87 (1·20–2·91)	0·0059	1·78 (1·13–2·80)	0·0130
Neurological	1·05 (0·69–1·58)	0·8263	1·40 (0·92–2·13)	0·1214
Pregnancy or perinatal	0·82 (0·48–1·38)	0·4509	0·72 (0·42–1·24)	0·2364
Respiratory	0·96 (0·62–1·48)	0·8518	1·02 (0·65–1·59)	0·9448
Skin	1·31 (0·84–2·03)	0·2363	1·48 (0·94–2·32)	0·0910
Spinal pain	0·40 (0·26–0·60)	<0·0001	0·41 (0·26–0·63)	0·0001
Miscellaneous	1·16 (0·75–1·80)	0·4960	1·37 (0·87–2·14)	0·1716
Wound	0·45 (0·29–0·71)	0·0004	0·54 (0·34–0·84)	0·0069
Year				
2005	1·32 (1·23–1·41)	<0·0001	1·53 (1·42–1·65)	<0·0001
2006	1·27 (1·18–1·36)	<0·0001	1·52 (1·40–1·65)	<0·0001
2007	0·91 (0·85–0·98)	0·0151	1·02 (0·94–1·11)	0·5620

Data are based on baseline characteristics of a male service member aged 29·8 years who is junior enlisted in the army, on active duty in Operation Iraqi Freedom, and has a battle injury with diagnosis of a blood disorder, in 2004.
*Adjusted for age, sex, and calendar year. †Centred at a mean of 29·8 years (n=33 865). ‡Senior refers to field-grade officer and above (>04) for commissioned officers (eg, major for army, air force, and marines; lieutenant commander for navy), or non-commissioned officer (eg, sergeant for army and marines; petty officer second class for navy) and above for enlisted personnel (>E5). Junior refers to lower-enlisted personnel or company-grade officer.

Table 7: **Logistic regression model of probability of return to duty after medical evacuation (n=34 006, r^2=0·1739)**

	Did not return to duty (n=2707)	Returned to duty (n=271)
Traumatic brain injury (n=218)	187 (86%)	31 (14%)
Substance abuse (n=98)	85 (87%)	13 (13%)
Stress reactions (n=803)	731 (91%)	72 (9%)
Depression or bipolar disorder (n=1045)	978 (94%)	67 (6%)
Other (n=814)	726 (89%)	88 (11%)

Data are number (% of individuals who had each diagnosis), and include individuals who were evacuated but were not service members. p=0·0003 for individuals who did not *vs* those who did return to duty.

Table 8: **Proportion of individuals with psychiatric diagnoses who were medically evacuated and did or did not return to duty (n=2978)**

in Germany, and less than 2% for those treated in the continental USA.[6] Possible explanations for the incline in psychiatric illnesses necessitating evacuation are the cumulative psychological effect of repeated deployments, the increasing manpower burden borne by reserve and national guard units, a decreased threshold for evacuation, and a shift in public opinion regarding the war in Iraq.[8–10]

A notable finding is the low occurence of return to duty for musculoskeletal and connective tissue disorders, and especially spinal pain. Compared with medical disorders with discrete pathology and unambiguous diagnostic criteria (eg, 80% return to duty after a diagnosis of nephrolithiasis, and 25% after appendicitis), the frequency of return to duty for spinal pain is very low and is similar to that of psychiatric disorders. The parallels between emotional distress and spinal pain are intriguing. Findings from several studies in patients presenting with back or neck pain have established that the major risk factors for disability and persistence are psychosocial (eg, anxiety, depression, poor coping skills, and low job satisfaction).[11–14] Although there has been a scarcity of military personnel in studies examining the relation between coexisting psychological morbidity and outcomes, results from preliminary data support a reduced frequency of return to duty in service members with spinal pain and a concurrent psychiatric diagnosis.[15,16] Conversely, service members with post-traumatic stress disorder (PTSD) have a high prevalence of coexisting pain disorders. In a retrospective study, Barrett and colleagues[9] reported that more than 95% of Gulf War veterans with persistent PTSD had frequent musculoskeletal complaints (eg, back pain), compared with less than 50% of veterans without PTSD.

Women were significantly more likely to return to duty than were men, and senior commissioned officers were significantly more likely to return to duty than were junior enlisted service members. Moreover, an increased proportion of senior commissioned officers returned to duty, and had an increased probability of return to duty, compared with senior enlisted service members and junior officers. The difference between sexes could be indicative of differences in their duties and, subsequently, the nature of their injuries and illnesses. With respect to rank, the increased percentage of return to duty in higher ranking service members is probably a result of several factors, such as heightened responsibility, increased time and emotional investment in the military, different type of job (ie, less physical and tedious), and the ability to return to work in a restricted capacity (ie, less physical).[17,18]

Compared with previous conflicts, our data from Operation Iraqi Freedom and Operation Enduring Freedom suggest a shift in injury patterns. In World War I, the three leading admission categories for US Naval and Marine forces, in descending order, were respiratory disease, infectious disease, and gastrointestinal disorders, with mental illness ranking eleventh. For both World War II and the Korean War, the top three causes of hospital admissions were respiratory disease, infectious disease, and non-battle-related injuries, with psychiatric disorders unchanged in ranking. By the Vietnam War, non-battle-related injuries had supplanted respiratory and infectious disease as the leading cause of hospital admissions, with psychiatric illness edging up to sixth.[1] During the Persian Gulf War, the top two reasons for admission of US army service members to hospital were injury and other musculoskeletal disorders, with mental illness ranking eighth.[19]

The increasing and disproportionate consumption of resources by non-battle-related injuries is not unique to US forces. In British troops stationed in Bosnia during peak levels of combat in 1996, the top four reasons for hospital admission were musculoskeletal, dermatological, gastrointestinal, and psychiatric disorders.[20] However, Operation Iraqi Freedom and Operation Enduring Freedom differ from previous conflicts in the length of the operations, the higher mean age and proportion of reserve service members, the number of repeat deployments, and the widespread availability of rapid communication.

The main limitation of this study is that the data contain the frequency of return to duty in service members who had been medically evacuated out of the combat zone to a level IV centre in Germany, and do not include the numbers treated within the combat zone. The true denominator for every medical category therefore remains unknown. For example, service members who are treated at the level IV regional medical centre in Germany for a psychiatric disorder have probably already failed several treatment attempts, since more than 80% of service members receiving treatment for combat stress remain with their units. Treatment of service members outside of their unit in an environment where they do not have support from their comrades is less likely to yield a positive result.[5,6] Notably, the number of service members seen at level I (battalion aid stations) and level III (combat support hospitals) treatment centres for the various disease categories is unknown. However, these medically evacuated individuals might represent only a small percentage of the total number with a specific disorder (ie, those with the most severe pathology, intense symptoms, or least motivation). In this situation, interventions are unlikely to be successful because these individuals probably already underwent previous treatments within the combat zone that were unsuccessful, had more motivation to leave their unit, or had commanders who did not want them to

remain with their unit. By contrast, if most individuals with a specific disorder have been medically evacuated and are seen at level I and level III treatment centres, then the probability of treatment success might be increased.

Our findings have several implications. First, non-battle-related injuries continue to be the leading cause of medical evacuation in modern warfare, and medical officers should be prepared for this burden in subsequent conflicts. To reduce the number of evacuees, preventive medicine programmes and educational initiatives need to target health-care providers, non-commissioned officers, and combat soldiers. Second, the burden of psychiatric illness will probably increase in correlation with the duration of the operation and increased reliance on reserve units. This effect is not limited to service members with primary psychiatric diagnoses only, but also extends to the decreased frequency of return to duty reported in patients who have been medically evacuated for other disorders and have psychiatric comorbidities.[15,16] Last, although disease and non-battle-related injuries account for most medical evacuations, battle injuries still comprise a substantial percentage. As the wounded-in-action to killed-in-action ratio continues to increase, more of these service members will need long-term medical care and social support services.

As survival rates of combat injuries increase, and the burden of non-battle-related injuries and psychiatric disorders continues to soar, society must be prepared to deal with the aftermath of these injuries. Resources should be allocated, and civilian physicians trained to manage medical disorders that are commonplace in war veterans, such as PTSD, traumatic brain injury, pain after amputation, other chronic pain disorders, and combat-related disability. Additionally, the sequelae of war might also include adverse social consequences, such as substance abuse, divorce, homelessness, and increased rates of suicide, homicide, and other felonies.[21–24]

Contributors

SPC designed the study. CB, CK, AP, and CN contributed to data collection. SAS analysed the data, and SPC, SAS, and CB interpreted the data. SPC wrote most of the report, with help from SAS. All authors edited the report and approved the final version.

Conflicts of interest

We declare that we have no conflicts of interest.

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Psychiatric problems in medically evacuated service members

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In *The Lancet* today, Steven Cohen and colleagues[1] report their prospective cohort study of medical evacuation and return to duty for service personnel in Operation Iraqi Freedom or Operation Enduring Freedom. They conclude that preventive measures and aggressive forward-deployed interventions could reduce the effect of non-battle-related injuries. Every subsequent war has seen improved medical interventions and better use of body armour. As a result, in the recent wars in Iraq and Afghanistan, the proportion of medical evacuations resulting from battle injuries is decreasing while operational stress injuries and other psychiatric disorders are playing an increasing part in medical evacuation. The most striking finding from today's study was that nearly three-quarters (72%) of service members who were evacuated for disease and non-battle injuries did not return to full duty. The situation is a particular problem for military personnel evacuated for psychiatric conditions.

The prevalence of mental health problems after deployments to Iraq and Afghanistan has been reported at between 11·3% and 27·2% in US and UK military personnel.[2,3] Specifically, rates of post-traumatic stress disorder (PTSD) in US military personnel have been estimated at between 11·2% and 17·1% after deployment in Iraq and Afghanistan, compared with a baseline rate of 5% before deployment,[4] whereas the UK military have reported lower rates of 4·8%.[3] Variation in PTSD rates might be related to the lapse between the end of a mission and the start of a mental health assessment, the nature and frequency of potentially traumatic events during the mission, or the length of deployment.

Despite the varying rates of PTSD after deployment and increased mental health resources devoted to treating combat stress, Cohen and colleagues' study showed an increased number of service personnel evacuated for psychiatric conditions and only a minority returned to active duty. Furthermore the presence of a comorbid psychiatric condition in soldiers with other medical conditions, such as spinal pain, decreased the probability of return to duty by 38%. This result is important because many studies have revealed an association between PTSD and physical health, including cardiovascular, gastrointestinal, musculoskeletal, respiratory, dermatological, and endocrine or metabolic problems, neurological or nervous system disorders, and pain or fibromyalgia.[5–7] Also, physical injury during deployment is a major risk factor for PTSD, which in turn is an independent risk factor that further contributes to failure to return to work after being injured.[8,9]

The low rate of return to duty in service personnel evacuated for psychiatric conditions warrants further

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study, and today's article points out the importance of cumulative stress in repeated deployments and the physical and mental demands on the military member and their family. Military personnel cannot refuse a lawful order to do dangerous or deadly operational activities, and the low rate of return to duty might be related to the nature of the combat operation for which military commanders might be reluctant to deploy an individual with a psychiatric diagnosis to a combat zone. Early intervention becomes crucial to help promote recovery because military members often experience substantial stigma disclosing symptoms of PTSD and other psychiatric problems.[4] However, despite important advances in pharmacological and psychotherapeutic treatments of PTSD, including comprehensive treatment guidelines,[10] responses in combat veterans have traditionally been poorer than have those in civilian populations.[11]

Factors that have been identified as predicting poor response in combat-related PTSD include chronicity, comorbidity, and high levels of anger which are often present in veterans with PTSD.[12] Military-specific factors, such as military training and the nature of deployment, which often involves months of persistent hyperarousal and hypervigilance in unfamiliar surroundings away from a social support network, are a negative predictor in veterans with military-related PTSD.[12] When they do seek treatment, patients with PTSD will often first present to their medical officer and might not initially disclose mental health problems but might instead present with repeated somatic or physical complaints.[13,14] As such, when dealing with the military, health-care personnel should have a high index of suspicion and screen for possible PTSD symptoms, especially if there is a physical injury.

Today's study emphasises that, as survival rates of combat injuries increase, the medical community will need to prepare for increased rates of non-battle-related injuries, such as psychiatric morbidity, especially military-related PTSD. Resources dedicated to developing specific treatment for war veterans are needed, and they should focus not only on symptom reduction but also on rehabilitation and improving quality of life to help to mitigate combat-related disability.

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Domestic and political violence: the Palestinian predicament

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In *The Lancet* today, Cari Clark and colleagues[1] present a cluster survey in which they investigated whether political violence was associated with male-to-female intimate-partner violence in the occupied Palestinian territory. They found that political violence was significantly related to higher odds of intimate-partner violence. Their report is a welcome addition to the scant literature that focuses on the sociopolitical context of intimate-partner violence, a subject that is under-researched, especially in the occupied Palestinian territory. The authors question the approach of isolating intimate-partner violence from political, economic, and social influences, and the assumption that domestic violence is about individuals and families, rather than also about the collective and the national. They link intimate-partner violence to chronic exposure to institutionalised structural violence, and thus contribute to a conceptual reframing of violence in terms of the inseparability of domestic and public spaces.[2]

In taking this approach, Clark and colleagues offer a rebuttal to the fixation on demonising Palestinian men and society with the use of a simple frequency to represent gender oppression in the occupied Palestinian territory.[2] When the Palestinian Central Bureau of Statistics first published their initial survey findings on intimate-partner violence,[3] the media, including human rights organisations, concluded that "23% of Palestinian women experience domestic violence". A misrepresentation of both the severity and the frequency of domestic violence were pointed out in later analyses.[2]

In the occupied Palestinian territory, violence is everywhere, existing in the "weave of life".[4] People face violence, brutality, and life chaos every day. Despite its pervasiveness, men are overwhelmingly the direct victims of political violence. By linking intimate-partner violence with exposure to direct and indirect forms of political violence, Clark and colleagues highlight some of the complexities entailed in the occurrence of intimate-partner violence. Their paper simultaneously destabilises the facile and problematic dichotomy in which men are seen automatically as perpetrators, with women as victims.

Today's Article supports a public health approach to understanding intimate-partner violence by inquiring about the interactions of psychological and social factors affecting the perpetration of violence between individuals.[5] The study acknowledges that family violence might be the result of multidimensional processes, with poverty as an associated factor,[6] and with poverty itself seen as a lethal form of violence.[7] In addition to poverty, the findings also point to Palestinian men's exposure to political violence and its social effect, which in turn can lead to violence. That is, a cycle of violence can be associated with the violation of everyday life under Israeli military occupation and colonisation. In this sense, today's Article raises the notion that intimate-partner violence might be the tip of the iceberg of violation and social suffering. Fanon[8] reminds us that when colonial aggression turns

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