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Shell shock: an outcome study of a First World War 'PIE' unit

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ABSTRACT

Background. 'Forward psychiatry' was introduced by the French Army in 1915 to stem the loss of troops to base hospitals. Also known by the acronym PIE (proximity to the battle, immediacy of treatment and expectancy of recovery, including return to duty), it was subsequently used by the British and Americans in both World Wars. The US Army used PIE techniques in Korea and Vietnam. Although widely accepted as an effective intervention, forward psychiatry is not amenable to random-controlled trials and only one controlled outcome study has been conducted.

Method. All 3580 soldiers with shell shock admitted to 4 Stationary Hospital between January and November 1917 were recorded. Unit details, military experience, length of stay and outcomes were analysed. Soldiers were categorized into combat, combat-support and non-combatant groups. Admissions were correlated with military operations to compare the impact of defensive and offensive phases of warfare.

Results. Rates of admission for shell shock rose significantly during offensives when physical casualties escalated. Combat troops were disproportionately represented. Over 50% of admissions had less than 9 months service in France and 21% broke down within 3 months of going overseas. Less than 20% returned directly to combat units, most going to other hospitals, convalescent depots or base duties.

Conclusions. Forward psychiatry was not effective in returning combat troops to fighting units but, by allocating soldiers to support roles, it prevented discharge from the armed forces. Uncertainties remain about relapses, including other routes that servicemen used to escape from a combat zone.

INTRODUCTION

'Forward psychiatry' has become an essential feature of modern military psychiatry in the UK, the USA and Israel (Martin *et al.* 1996). Many claims have been made for its effectiveness both as a treatment for combat stress reaction and as a prophylaxis for long-term psychiatric disorder. In essence, the intervention was defined by three core principles: proximity to battle designed to negate any sense of having escaped the fighting; immediacy of treatment to prevent the formation of symptoms; and expectation of recovery. Thomas Salmon (1876–1927) described the three elements in his strategy for the management of psychiatric casualties commissioned by the American Expeditionary Force (Salmon, 1917). Despite claims to the contrary (Cozza & Hales, 1991), Salmon did not devise the acronym 'PIE', which was the work of Artiss (1963). The first forward psychiatric centres had been set up in summer 1915 by doctors in the French Army who had become concerned by the number of functional cases being referred to base hospitals and therefore lost to fighting units (Roussy & Lhermitte, 1918; Léri, 1919). Under the guidance of C. S. Myers (1873–1946), consultant psychologist,

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similar specialist units were opened for the British Expeditionary Force (BEF) in December 1916.

During the First World War, British doctors argued that between 55% and 90% of men treated by PIE methods were returned to duty with combatant units. Having set up forward psychiatric centres for the Republican Army in the Spanish Civil War, Emilio Mira claimed that 93·6% of Republican soldiers were treated successfully and only 1·5% discharged from the forces (Mira, 1943, p. 73). While military psychiatrists in the Second World War were less optimistic, they regularly quoted return-to-duty rates of over 50% (Jones & Wessely, 2001).

Similar success stories have been told for the effectiveness of PIE treatments in Korea (Glass, 1954; Arthur, 1978) and Vietnam, where the low rates of psychological disorders recorded in theatre were ascribed to the widespread use of forward psychiatry (Tiffany, 1967). The most comprehensive study of PIE methods, an evaluation of Israeli forward psychiatry during the Lebanon War of 1982, suggested that not only was the treatment of acute effects more effective than in base hospitals but also it served to inhibit the development of post-traumatic stress disorder (Solomon & Benbenishty, 1986). A recent UK study of the Iraq conflict found that of 170 admissions, 123 (72%) were returned to duty and only 47 (28%) evacuated (Scott, 2005). Although cases were categorized according to rank and gender and between regulars and territorials, it was not recorded how many of the 123 were from front-line battalions rather than combat-support units.

In December 1916, following a manpower crisis created by the Somme offensive, Sir Arthur Sloggett (1857–1929), Director-General of Army Medical Services, agreed to the creation of four forward psychiatric units for the rapid treatment of shell shock. They were called 'Not Yet Diagnosed Nervous (NYDN) Centres' to avoid medical terminology and to promote an attitude of recovery. The First and Second Armies were served by a single NYDN Centre opened in January 1917 within 4 Stationary Hospital at Arques about 28 miles from the Ypres salient. At first, only 150 beds were allocated to the shell-shock division. Growing numbers of referrals led to progressive expansion and by July 1917 over 1800 patients were treated in the hospital, most of whom were diagnosed with shell shock (War Diary, 1915–1919*a*).

The NYDN Centre was commanded of Major Dudley Carmalt-Jones (1874–1957), formerly dean of Westminster Hospital Medical School and a specialist in vaccination. Its aim was defined as the 'early and special treatment in order to secure the return of all possible cases to their units and the employment on useful work as many as possible of the rest' (War Diary, 1915–1919*a*, 14 March 1917). Opened on 2 January, the NYDN Centre was closed on 9 November 1917, a day before the third battle of Ypres ended, its beds being reallocated to soldiers with venereal disease. Only other ranks and non-commissioned officers (NCOs) were admitted. Officers with shell shock were sent to 7 General Hospital at St Omer, although in July, when the numbers became too great, 59 General Hospital at Moulle took over their treatment (Anon, 1917*a*, p. 7).

The operation of the shell-shock unit fell into two distinct phases: routine trench warfare and major offensives. Although the four NYDN Centres coped with the low level of psychiatric casualties associated with defensive operations, large-scale attacks stretched their capacity (Jones, 2006). A series of battles were fought on the Western Front during the life of the PIE unit at 4 Stationary Hospital. The first involved the Third Army at Arras from 9 April until early May, followed by the assault of the Second Army on Messines Ridge on 7 June (Prior & Wilson, 1996). Offensive operations continued into the autumn, including an attack on Polygon Wood by the Second Army, which produced such a flood of shell-shock patients that the overflow had to be referred to the New Zealand Stationary Hospital at Wisques (Porter, 1917). Rates of admission varied according to the military situation. On 31 July, for example, when the Fifth Army conducted a set-piece attack at Ypres, over 600 cases of shell shock arrived from Hazebrouck. In May 1917, when overspill casualties from the Third Army's offensive at Arras arrived, beds were released by evacuating chronic or severe cases (War Diary, 1915–1919*a*, 1 May 1917).

For most patients, treatment in PIE centres involved rest, hot food and a programme of graduated exercise, culminating in route

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marches. Carmalt-Jones favoured 'physical applications', including 'hot-water bottles and fomentations for occipital pain, and ice-bags and evaporating lotions for frontal pain' (Carmalt-Jones, 1919, p. 182). He occasionally used 'faradization', or electric shock by way of a wire brush, for stuporose patients or those exhibiting symptoms of anaesthesia or paresis.

Using original sources, this paper attempts to challenge orthodoxy about the effectiveness of PIE methods. It tests the null hypothesis that forward psychiatric centres set up in December 1916 to serve the British Army were not effective in their primary role of returning soldiers to combat units.

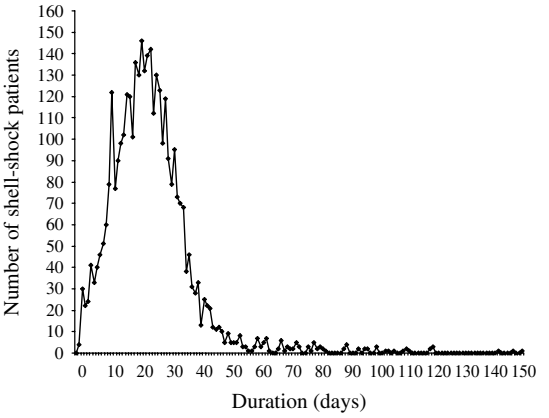


FIG. 1. Time spent as in-patient at 4 Stationary Hospital.

METHOD

Data were extracted from the admission and discharge books of 4 Stationary Hospital for the period that it served as an NYDN Centre (Anon, 1917*b*). These were standard volumes issued to all Royal Army Medical Corps' hospitals in France and their design did not vary. A total of 3580 cases of shell shock or neurasthenia were found. Each patient had an entry that recorded their unit, army number, age, length of service with the BEF, dates of admission and discharge, together with a note about where they were sent after treatment. No cases were omitted even if an entry was incomplete. Missing data were limited to rank, length of service, age and outcome. Admissions for shell shock or neurasthenia were analysed and related to changing phases of battle over the 10 months of the centre's operation.

RESULTS

Patients

The mean admission was 25 days, and the longest period of treatment was 150 days (Fig. 1). The mean age on admission was 26·6 years. The youngest referral was 17, while the oldest was 59 years. Most patients were private soldiers: 2970 (83%). Corporals accounted for 418 (11·7%) admissions and 156 (4·4%) were sergeants and warrant officers; in 36 cases (1%) information was missing. These findings suggest that rank did not protect against breakdown. Typically, an infantry platoon consisted of 50 to 60 men, commonly in a ratio of one NCO to 10 privates. On this basis, NCOs were slightly over-represented among admissions to the NYDN Centre at 4 Stationary Hospital. This picture for the First World War contrasts with a recent study of Gulf War and Bosnia veterans, which found that disability related to medically unexplained symptoms was associated with lower rank (Ismail *et al*. 2002). However, the military context was different. The Gulf War was a short conflict fought mainly by regulars, while the First World War involved a mass citizen army in a protracted, attritional campaign. Many NCOs deployed to the Gulf would have had lengthy experience and training, while those in the trenches owed their promotion, in part, to combat service in France. They may have been more likely to break down simply because of their extended combat exposure.

Nevertheless, the picture remains incomplete, as there are no data for officers who were treated at 7 and 59 General Hospitals, the admission and discharge books having been destroyed. Anecdotal evidence suggests that officers who broke down in the front line received preferential treatment in the belief that, as better educated and more imaginative, they carried a greater burden of responsibility than private soldiers or NCOs (Mott, 1919, p. 131). On occasion, officers were transferred to base units or invalided with a medical diagnosis to protect the honour of the battalion, both categories being lost to shell-shock statistics. It is unlikely that infantry and artillery officers were protected from psychological trauma by their rank

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Table 1. *Admissions for shell shock to 4 Stationary Hospital, Arques, during 1917*

Type of unit	1–31 January	1–28 February	1–30 March	1–30 June
Infantry	100 (94·3)	69 (86·3)	95 (84·1)	733 (64·6)
Artillerymen	4 (3·8)	7 (8·8)	10 (8·8)	247 (21·8)
Engineers	1 (0·9)	2 (2·5)	6 (5·3)	56 (4·9)
Subtotal	105 (99·1)	78 (97·5)	111 (98·2)	1036 (91·3)
Combat support	1 (0·9)	1 (1·3)	1 (0·9)	87 (7·7)
Medics (RAMC)	0 (0)	1 (1·3)	1 (0·9)	12 (1·1)
Total	106	80	113	1135

RAMC, Royal Army Medical Corps.
Figures in parentheses are percentages.
Source: Admission and Discharge Books for 4 Stationary Hospital, 24 January 1917 to 2 July 1917 (Public Record Office, MH 106/1465-1478).

Table 2. *Shell-shock cases admitted to 4 Stationary Hospital: length of active service before breakdown*

Length of service in France before admission (months)	Total admissions with full service histories ($n=3060$) *n* (%)
1–3	654 (21·4)
1–6	1232 (40·3)
1–9	1584 (52·3)
1–12	1954 (63·9)
1–18	2453 (80·2)
1–24	2786 (91)
1–30	2977 (97·3)

as they suffered disproportionately high killed and wounded rates.

Rates of admission

During the first 3 months of its operation, a period of routine trench warfare, admissions to the shell-shock unit were steady and at a relatively low level (Table 1). Referrals rose in April, the result of the offensive at Arras. Patients were analysed by unit to show whether they had come from front-line battalions or from combat-support units. For these 3 months, all but five admissions to the shell-shock division were soldiers directly engaged in battle, the majority being infantrymen. Combat-support troops (Army Service Corps and Labour Corps) and non-combatant medics were scarcely represented.

The frontal assault on Messines Ridge was responsible for most of the 25 000 casualties. Admissions for shell shock escalated. On the 7 June alone, over 50 cases were referred, followed by 100 on the next day, and 1 month after the offensive had begun 1800 psychiatric casualties had been admitted. The dramatic rise in the number of referrals reflected not only the heightened stress experienced by soldiers attacking well-defended positions but also the deployment of increased numbers of troops.

The character of admissions was determined by the offensive nature of warfare. The attack was preceded by an artillery bombardment, which in turn inspired a German counter-barrage. As a result, the most significant change was an increase in the proportion of gunner patients, rising from 9·1% in March to 21·8% in June (Table 1). Combat-support troops also increased from 1% to 7·7%, largely because an advancing army required greater logistic support than a stationary one operating from defensive positions. The largest category of admissions was infantry, those at greatest risk of death or wounding. Front-line combat troops were the most likely to break down and the association between physical and psychiatric casualties is well described (Beebe & De Bakey, 1952; Blood & Gauker, 1993; Jones & Wessely, 2001).

Breakdown

The mean length of time that a soldier had spent on active service in France before admission was 11·2 months and the mode 2 months (Table 2). For many, breakdown was rapid: 21·4% ceasing to function within the first 3 months of being deployed to a war zone and 40·3% within 6 months (Fig. 2). Peaks were observed at 12 months (63·9%) and 24 months (91%), suggesting an element of self-referral on the basis that soldiers believed they had served their time. The 9% who broke down after more than 2 years of active service were probably men worn out by long exposure to combat, so-called 'old sergeant syndrome'. Occurring in 1917, all breakdowns took place when there was no immediate prospect of the war ending. In a remorseless war of attrition, the only way out for an infantryman was wounding, disease or death.

Units

Some infantry battalions suffered high rates of breakdown. The largest totals included 40

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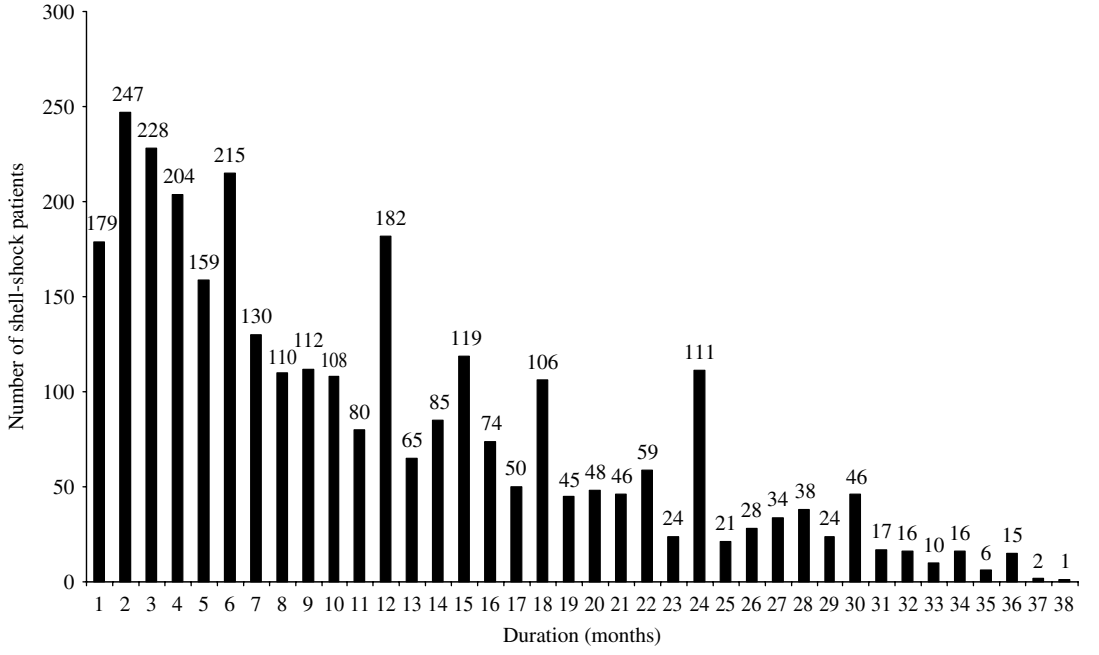


FIG. 2. Length of overseas service before admission.

riflemen from the 21st King's Royal Rifle Corps, which represented about 5% of its theoretical strength. In many cases these were battalions that had suffered heavy casualties. The 24th, 22nd, 21st and 23rd London Regiments led the attack on Messines Ridge and, when their attack failed, an abortive assault was launched with three companies from the 20th London Regiment (Edmonds, 1948). Total casualties were 178 killed and 909 wounded or missing (Maude, 1922). All five battalions saw psychiatric casualties admitted to 4 Stationary Hospital: from the 23rd London (36 infantrymen), 20th London (28), 24th London (27), 21st London (8) and 22nd London Regiments (13). The scale of physical casualties, differing levels of morale, training and leadership, plausibly explained such wide variations in breakdown rates.

Outcomes

Most soldiers (35·1%) were discharged to convalescent depots opened along the coast between Boulogne and Trouville (Table 3). The realization in 1917 that few casualties evacuated to the UK returned to fighting units at the front led to the opening of vast tented camps in France designed to turn discharged patients into fit soldiers. Established at Trouville with 5000 beds, 13 Convalescent Depot admitted 66 800 soldiers between August 1917 and January 1919 (War Diary, 1917–1919*a*, History, p. 5). Although set up to accelerate recovery, there is evidence to suggest that the very opposite occurred. With programmes of marching, indoor recreation, outdoor games and manual occupations, they were designed to 'give the men a cheerful and enjoyable time, while strengthening their bodies by regular and … interesting exercise' (Herringham, 1919, p. 22). Not surprisingly, many men preferred these activities to fighting in a trench and the depots rapidly became congested. For example, 12 Convalescent Depot, based at Aubengue near Wimereux, grew rapidly from its establishment capacity of 100 beds in June 1917 to 477 by mid-July, while in spring 1918 orders were given to increase its capacity to 6000 (War Diary, 1917–1919*b*). In September 1917, it took 194 shell-shock cases from 4 Stationary Hospital alone. The depot appears to have returned very few to fighting units at the front, most discharged soldiers

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Table 3. *Outcomes of shell-shock patients discharged from 4 Stationary Hospital between 2 January and 9 November 1917*

Outcome	Number (%) of shell-shock patients
Returned to duty	606 (16·9)
To other hospital in France	687 (19·2)
To convalescent camp	1257 (35·1)
Ambulance train to base	286 (8·0)
To base duties	700 (19·6)
Not recorded	44 (1·2)
Total	3580 (100)

being sent to 'base details' or to the Labour Corps at base depots. Because no admission and discharge books survive for any camp, no systematic study of outcomes has been possible.

The scale of referrals from 4 Stationary Hospital and elsewhere between August and October 1917 suggests that PIE units could not cope during major offensives and that convalescent depots functioned as unofficial psychiatric treatment centres, albeit in the rear. On 2 August 1917, following the Second Corps' assault on the Gheluvelt Plateau, 7 Convalescent Depot at Camiers received 390 walking-wounded direct from the front (War Diary, 1915–1919*b*). Transferring 250 existing convalescents to distant depots at Trouville had cleared beds to accommodate them. A cascade system operated, depending in part on the severity of cases, intensity of the fighting and proximity to the front line.

Further treatment was required for almost 30% of servicemen discharged from the PIE unit at 4 Stationary Hospital, with 19·2% transferred to other hospitals and 8·0% dispatched by ambulance train. Almost 20% went to base duties in France as part of the mighty logistics exercise required to support a mass industrial army.

Only 606 (19·6%) returned to active duty. It is impossible to say how many of these relapsed once they had returned to the trenches. Some evidence suggests that these figures were significant. Of the 606, 15 (2·5%) were readmitted to 4 Stationary Hospital shortly after discharge, while of the 3580, 93 (2·6%) had two admissions. Elsewhere, of 150 cases of shell shock referred to 12 General Hospital at Rouen in 1916, 27% were men who had experienced an earlier breakdown (Wiltshire, 1916).

A return to combatant duty rate of 19·6% was considerably less than claimed at the time and lower than commonly reported during the Second World War by British forward psychiatric units. Hunter (1946), who ran a PIE centre in Italy in 1944 during bitter fighting north of the Volturno, recorded 30% 'returned to combatant duty with their original units' (p. 127). Data for subsequent conflicts are scarce. The only surviving data for 25 Field Dressing Station, the specialist unit for Commonwealth troops in Korea referred to September 1952, when, of seven cases admitted, three were evacuated, two returned to limited duty and two returned to their units (War Diary, 1952). Anecdotal reports suggested that most soldiers returned to some form of duty after further training and assessment (Jones & Palmer, 2000). Although the US Army introduced forward psychiatric teams almost from the outset, no attempt was made to test their effectiveness. Hausman & Rioch (1967) subsequently claimed that 65% to 75% of combat exhaustion patients were returned to duty, although a detailed investigation of a small sample showed that only 44% were assessed as performing at an average or better level.

No PIE outcome statistics have been published for the Vietnam War. For the Lebanon conflict, Noy *et al.* (1984) showed that 59% of those Israeli soldiers with combat stress reaction who were treated in forward units were returned to their units in comparison with 39·5% airlifted to the rear and then transported to base hospitals. No follow-up was undertaken to investigate relapses and patients were not categorized by military role. Furthermore, this was not a random allocation between different types of intervention. Soldiers with a better prognosis and the highest expectancy of return were probably sent to forward units. Conversely, commanders have traditionally used medical evacuations to transfer disruptive or inefficient men. An inherent bias in the management of psychiatric casualties may have distorted the results. Indeed, in a subsequent report, Solomon & Benbenishty (1986) showed that 38% of those treated near the front had post-traumatic stress disorder compared with 74% of those sent to the rear.

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DISCUSSION

Observations of shell-shock cases at base hospitals, both on the French coast and in the UK, suggested that symptoms tended to multiply the longer a man was an in-patient and the further he travelled from the front (Salmon, 1917; Shephard, 1996). The NYDN Centre at Arques was designed to treat psychiatric casualties quickly without the expectation that a soldier could escape the hazards of the front for the relative comfort of the rear.

Publication bias

During the war and its immediate aftermath, a number of clinicians who had managed PIE centres published favourable outcome statistics. William Brown, who ran the NYDN unit for the Fourth Army, reported that 70% returned to fighting units after an average of 2 weeks of treatment (Brown, 1918). Between November and December 1917, at the time of the Cambrai offensive, he claimed a success rate of 91% (Brown, 1919, p. 833). William Johnson, in command of the NYDN unit for the Fifth Army during the battle of Passchendaele between August and October 1917, treated 5000 cases of which he estimated 55% were returned to duty in the same units and only 16% evacuated to bases (Johnson & Rows, 1923, p. 41). A detailed study of 132 cases of shell shock treated at the same centre in August 1917 claimed that 96 (73%) were returned to duty with only 36 (27%) going to bases (Russel, 1919). Frederick Dillon, psychiatrist to the NYDN Centre for the Third Army at 6 Stationary Hospital, calculated that 63·5% of 4235 admissions in the 22 months to October 1918 were returned to duty, mainly to fighting units (Dillon, 1939). In the aftermath of the war, Carmalt-Jones (1919) recalled that there had been 'vicious' competition between the various NYDN Centres and between 'rival methods of treatment for the return of patients to their units' (p. 199).

During summer 1917, doubts about the effectiveness of PIE methods, based on the suggestion that discharged servicemen continued to circulate through the wider hospital system, prompted an investigation by Gordon Holmes (1876–1965), consultant neurologist to the BEF. Having conducted an audit of three forward centres, he reported that only 10% of their patients had a second admission for shell shock (Johnson & Rows, 1923, p. 43). His actions spoke louder than his words as he closed the centre at 4 Stationary Hospital in November 1917. Significantly, Holmes did not explore the possibility that those returned to combatant duties sought other routes from the front, including disciplinary offences, desertion and admission to other types of hospital. A survey by Glass (1947) of 393 US troops treated in a divisional neuropsychiatric unit during the Apennines campaign between March and April 1945 revealed that two-thirds of those who later relapsed did so by other routes (principally disease, injury or military offence). Although Glass concluded that the majority of psychiatric casualties could return to non-combatant base or support duties, he calculated that only 30% went back to active duty (Glass, 1947). Nevertheless, in July 1939 as Britain prepared for war, Holmes argued that 80% of cases treated by forward psychiatric units during the First World War had been returned to their original units within 3 weeks, in contrast to 30–40% at base hospitals in France and only 4–5% in UK hospitals (Holmes, 1939, p. 12). Whether, in the light of his earlier investigation, he believed in the validity of these statistics is not known.

Thus, the First World War appeared to offer PIE methods a solid foundation of empirical evidence: favourable outcomes from a variety of centres published in established medical journals. If forward psychiatry had been such a spectacular success in the past, it was inconceivable that it would no longer work in new conflicts. Any clinician who could not match these results would have felt vulnerable to criticisms of professional competence. In general, military psychiatrists in both World Wars were under pressure to prove their worth. Unlike surgeons and physicians, they could not point to unambiguous evidence of cures. Some medical colleagues and commanders doubted the wisdom of employing them. Manpower shortages undermined the effectiveness of the British Army from summer 1916 and again in 1943. If military psychiatrists could demonstrate that psychological casualties of battle could be returned to fighting units within a few weeks, then their worth was beyond question and their status would rise accordingly. For some,

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the temptation to inflate return-to-duty rates proved irresistible.

Military context

The NYDN Centre at Arques operated at a time of false hope when a series of offensives in the Ypres sector failed to open a gap in the German front line. The British Army suffered 275 000 casualties, including 70 000 killed. The absence of a decisive battlefield victory in the context of substantial losses dampened but did not break British morale. Significant numbers of psychiatric battle casualties were, in part, a function of an eroded fighting spirit.

The expectations of British troops admitted to forward psychiatric units operating in the Western Desert, Normandy and the jungles of Burma were probably not very different to those of their First World War counterparts, or indeed of their successors deployed to Korea and Vietnam, both lengthy wars of attrition. However, recent conflicts, which have been far briefer, may have generated different expectations. Although the Lebanon War of 1982 proved a protracted campaign, it was conceived as a short-term incursion. It is possible that troops were more willing to return to active duty in the belief that the conflict was close to a successful conclusion.

Clinical practice

Although techniques varied between NYDN units, there was a broad similarity between treatments. No significant differences have been detected with practices in the Second World War apart from the use of barbiturates to induce an initial period of sleep in agitated patients. The forward unit set up at 25 Canadian Field Dressing Station for Commonwealth forces deployed to Korea followed the same management plan (Jones & Palmer, 2000). There is no report of any clinical innovation in PIE methods in Vietnam or the Lebanon.

CONCLUSIONS

Published accounts of PIE centres in the First World War formed the foundation of the orthodox belief that forward psychiatry was an effective treatment for shell shock. This study has demonstrated that outcome statistics were both inaccurate and misleading.

Although PIE principles continue to be practised in Iraq, the heyday of forward psychiatry has passed. This study shows that it is effective in keeping soldiers in the armed forces in productive combat-support roles, but the intervention has limited value in returning front-line troops to battle. The practical constraints of having to gather, assess and treat servicemen restricted large-scale PIE operations to static or slow-moving fighting. As a result, forward psychiatry was practised in some phases of the Western Desert campaign, during the advance of the British forces through Italy and North West Europe and belatedly in the Korean War (Jones & Wessely, 2005). Typically, combat today is fast moving and short lived, limiting the application of PIE principles. However, they may continue to have a role for troops engaged in counter-insurgency and peacekeeping operations. Some merit remains in the bank-balance hypothesis of courage proposed by Wilson (1945) that soldiers have a finite stock of fortitude that is never fully replenished in rest periods between battles. Many of those who made it to a PIE unit were either in overdraft or close to going into the red. Carmalt-Jones concluded that after a second breakdown no treatment would restore a soldier's mental health to the point at which he could again cope with the intense stress of combat.

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DECLARATION OF INTEREST

None.

REFERENCES

Anon (1917*a*). *DMS Instructions*. HMSO: London (Public Record Office, WO 95/197).

Anon (1917*b*). Admission and Discharge Books for No. 4 Stationary Hospital, 24 January 1917 to 12 March 1917 (Public Record Office, MH 106/1465-1467).

Arthur, R. J. (1978). Reflections on military psychiatry. *American Journal of Psychiatry* **135** (Suppl.), 2–7.

https://doi.org/10.1017/S0033291706009329 Published online by Cambridge University Press

Artiss, K. L. (1963). Human behaviour under stress: from combat to social psychiatry. *Military Medicine* **128**, 1011–1015.
Beebe, G. W. & De Bakey, M. E. (1952). *Battle Casualties: Incidence, Mortality, and Logistic Considerations*. Charles C. Thomas: Springfield, IL.
Blood, C. G. & Gauker, E. D. (1993). The relationship between battle intensity and disease rates among Marine Corps infantry units. *Military Medicine* **158**, 340–344.
Brown, W. (1918). The treatment of cases of shell shock in an advanced neurological centre. *Lancet* **2**, 197.
Brown, W. (1919). War neuroses. *Lancet* **2**, 833.
Carmalt-Jones, D. W. (1919). War-neurasthenia, acute and chronic. *Brain* **42**, 171–213.
Cozza, K. L. & Hales, R. E. (1991). Psychiatry in the army – a brief historical perspective and current developments. *Hospital and Community Psychiatry* **42**, 413–418.
Dillon, F. (1939). Neuroses among combatant troops in the Great War. *British Medical Journal* **2**, 66.
Edmonds, J. E. (1948). *Military Operations: France and Belgium 1917*. HMSO: London.
Glass, A. J. (1947). Effectiveness of forward neuropsychiatric treatment. *Bulletin of the US Army Medical Department* **7**, 1034–1041.
Glass, A. J. (1954). Psychotherapy in the combat zone. *American Journal of Psychiatry* **110**, 725–731.
Hausman, W. & Rioch, D. M. (1967). Military psychiatry, a prototype of social and preventative psychiatry in the United States. *Archives of General Psychiatry* **16**, 727–739.
Herringham, W. (1919). Medicine in the war: a retrospective sketch. *British Medical Journal* **1**, 20–23.
Holmes, G. (1939). Report of a conference on 'neuroses', 10 November 1939 (Public Record Office, PIN 15/2402), p. 12.
Hunter, D. (1946). The work of a corps psychiatrist in the Italian campaign. *Journal of the Royal Army Medical Corps* **86**, 127–130.
Ismail, K., Kent, K., Brugha, T., Hotopf, M., Hull, L., Seed, P., Palmer, I., Reid, S., Unwin, C., David, A. & Wessely, S. (2002). The mental health of UK Gulf war veterans: phase 2 of a two-phase cohort study. *British Medical Journal* **325**, 576–579.
Johnson, W. & Rows, R. G. (1923). Neurasthenia and war neuroses. In *History of the Great War Based on Official Documents, Medical Services, Diseases of the War*, vol. 2 (ed. W. G. Macpherson, W. P. Herringham, T. R. Elliott and A. Balfour), pp. 1–67. HMSO: London.
Jones, E. (2006). The psychology of killing: the combat experience of British soldiers during the First World War. *Journal of Contemporary History* **41**, 229–246.
Jones, E. & Palmer, I. (2000). Army psychiatry in the Korean War: the experience of 1 Commonwealth Division. *Military Medicine* **165**, 1–16.
Jones, E. & Wessely, S. (2001). Psychiatric battle casualties: an intra- and inter-war comparison. *British Journal of Psychiatry* **178**, 242–247.
Jones, E. & Wessely, S. (2003). 'Forward psychiatry' in the military: its origins and effectiveness. *Journal of Traumatic Stress* **16**, 411–419.
Jones, E. & Wessely, S. (2005). *Shell shock to PTSD, Military Psychiatry from 1900 to the Gulf War*. Psychology Press: Hove.
Léri, A. (1919). *Shell Shock, Commotional and Emotional Aspects*. University of London Press: London.
Martin, J. A. & Cline, W. R. (1996). Mental health lessons from the Persian Gulf War. In *The Gulf War and Mental Health: A Comprehensive Guide* (ed. J. A. Martin, L. R. Sparacino and G. Belenky), pp. 161–178. Praeger: Westport.
Maude, A. H. (1922). *The 47th* (*London*) *Division 1914–1919*. Amalgamated Press: London.
Mira, E. (1943). *Psychiatry in War*. W. W. Norton: New York.
Mott, F. (1919). *Neuroses and Shell Shock*. Henry Froude and Hodder & Stoughton: London.
Noy, S., Levy, R. & Solomon, Z. (1984). Mental health care in the Lebanon War 1982. *Israel Journal of Medical Sciences* 20, 360–363.
Porter, R. (1917). War Diary, Surgeon-General, DMS, Second Army (Public Record Office, WO 95/286).
Prior, R. & Wilson, T. (1996). *Passchendaele, The Untold Story*. Yale University Press: New Haven.
Roussy, G. & Lhermitte, J. (1918). *The Psychoneuroses of War*. University of London Press: London.
Russel, C. K. (1919). The management of psycho-neuroses in the Canadian army. *Journal of Abnormal Psychology* **14**, 27–33.
Salmon, T. W. (1917). The care and treatment of mental diseases and war neuroses ('shell shock') in the British Army. *Mental Hygiene* **1**, 509–547.
Scott, J. N. (2005). Diagnosis and outcome of psychiatric referrals to the Field Medical Health Team, 202 Field Hospital, Op Telic 1. *Journal of the Army Medical Corps* **151**, 95–100.
Shephard, B. (1996). The early treatment of mental disorders: R. G. Rows and Maghull 1914–1918. In *150 Years of British Psychiatry: The Aftermath*, vol. 2 (ed. H. Freeman and G. E. Berrios), pp. 434–464. Gaskell: London.
Solomon, Z. & Benbenishty, R. (1986). The role of proximity, immediacy, and expectancy in frontline treatment of combat stress reaction among Israelis in the Lebanon war. *American Journal of Psychiatry* **143**, 613–617.
Tiffany, W. (1967). The mental health of army troops in Vietnam. *American Journal of Psychiatry* **123**, 1585–1586.
War Diary (1915–1919*a*). 4 Stationary Hospital, July 1915 to October 1919 (Public Record Office, WO 95/4099).
War Diary (1915–1919*b*). 7 Convalescent Depot, June 1915 to January 1919 (Public Record Office, WO 95/4120).
War Diary (1917–1919*a*). 13 Convalescent Depot, August 1917 to January 1919 (Public Record Office, WO 95/4121).
War Diary (1917–1919*b*). 12 Convalescent Depot, June 1917 to May 1919 (Public Record Office, WO 95/4121).
War Diary (1952). Assistant Director of Medical Services, January to December 1952 (Public Record Office, WO 281/887).
Wilson, C. [Lord Moran] (1945). *The Anatomy of Courage*. Collins: London.
Wiltshire, H. (1916). A contribution to the etiology of shell shock. *Lancet* **1**, 1207–1212.

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