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**Research Article**

# A Retrospective analysis of Five Years Musculoskeletal Injury Data in British Infantry Recruits

**Abstract**

**Background:** Musculoskeletal injury (MSKI) has been identified as a threat to the effectiveness and productivity of military training organisations globally. The burden on the medical chain, occupational disposal and the loss of working days due to temporary functional restriction challenges organisational efficiency and ultimately operational capability whilst also representing a significant socio-economic burden. The British Ministry of Defence (MoD) has a moral, legal and professional responsibility to reduce the likelihood of avoidable injuries through sound risk assessment, application of best practice and determining effective prevention strategies.

**Aim:** The aim is to provide a retrospective observational analysis of five years' injury data collected at the Primary Care Rehabilitation Facility (PCRf) at the Infantry Training Centre, Catterick (ITC). It is intended to add to the existing body of injury surveillance data and potentially provide justification and direction for future strategic interventions designed to address injury incidence.

**Methods:** This was a retrospective observational analysis of 4,777 musculoskeletal injuries presenting from a total inflow of 12,501 British Army Infantry recruits recorded over five consecutive training years between 1<sup>st</sup> April 2012 to 31<sup>st</sup> March 2017. Injury incidence, site, type and week of training were recorded and analysed.

**Results:** The five-year cumulative incidence of the total recruit inflow was observed as 38.2% (95% Confidence Interval (CI): 37.4-39.1%). The sub classification of injury incidence was: overuse (non-fracture) 23.9% (95% CI: 23.1-24.6%), Trauma 8.8% (95% CI: 8.3-9.3%) and stress fractures (5.5%: CI 95%: 5.14-5.9%). All overuse injuries (including stress fractures) were most prevalent, accounting for 77.5% of all referrals to physiotherapy and represented the largest sub-classification of MSKI to result in medical discharge.

**Conclusion:** A review of MSKI data collected from five consecutive training years at the British Infantry Training Centre highlighted the prevalence of MSKI within recruit trainees. The findings of this paper substantiate the requirement for on-going comprehensive analysis as a basis for identifying injury patterns as well as describing the impact of strategically introduced health promotion and injury prevention strategies such as Project OMEGA.

**Introduction**

The Infantry Training Centre (ITC), Catterick delivers both Phase 1 and Phase 2 training to a maximum of 4,000 recruits per year [1-2]. Combat Infantryman's Course (CIC) which consist of both phase 1 and phase 2 training. Phase 1, consist of an initial military training lasting for 13 weeks whilst phase 2 consist of infantry specific military training lasting a minimum of 14 weeks [3]. CIC is the framework upon which all regular infantry recruit training is based and is the entry point for the British Army Infantry Regiments [2,4-6]. The CIC course is designed to develop soldering skills, army values and lifestyle

and turn civilian recruit into a fully qualified infantry soldier prepared for combat operations. The course is both physically and mentally demanding, arduous and stressful in order to prepare the recruits to work effectively in various situations. The completion of CIC training is mandatory for all infantry recruit to progress their infantry career [6].

The planning, resourcing and administrative coordination across the ITC is the responsibility of the Support Battalion whilst the physical training component is delivered by All Arms Physical Training Instructors (AAPTIs) under the management and supervision of the Royal Army Physical Training Corps

(RAPTC). Medical support is delivered under the direction of the Royal Army Medical Corps (RAMC) and within the governance of Defence Primary Healthcare (DPHC).

Delivered over a minimum of twenty eight weeks, the CIC is considered the most physically arduous and demanding of all initial military training courses in the British Army [1-6]. The intensity, volume and frequency of physical activity is greater than that which the majority of recruits have previously been exposed to [1-4]. Training is designed to develop aerobic fitness, muscular strength and physical endurance through the progressive delivery of running, resistance training and occupational military tasks [1,2,5,6]. However, it is widely considered that the inability to adapt to rapid increases in high impact physical activity is a key contributory factor in the subsequent development of musculoskeletal injuries (MSKI) [1,7,8].

MSKI have long been recognised to represent a significant challenge to the efficiency and therefore operational effectiveness of global military populations [1,9-21]. The incidence of MSKI within infantry training establishments has drawn specific attention with injury rates reported to range globally from 20% to 60% [1-4,6,8,15,16].

A study by Sharma et al. [2,6], observed an overall MSKI incidence of 48.6% MSKI in British Infantry recruits at the ITC whilst Robinson et al. [16], later reported an overall incidence as high as 58% for recruits within the same institution. Recently, Heagerty and colleagues [1], observed as many as 39.1% of infantry recruits, undergoing basic training, to report at least one MSKI in the same institution.

Largely attributable to the incidence of MSKI, the medical discharge rate at the ITC has been reported as high as 8% [5], with as many as 33% of recruits discharged prior to completion of the training due to a variety of reasons. These include medical discharge, voluntarily release or professional training failures [6]. The far reaching challenges to organisational effectiveness presented by MSKI are not unique to the British Army but are found to occur across military training establishments globally [1,9,14,22]. Musculoskeletal military training injuries are considered to contribute to morbidity, loss of training time, impaired performance, a strain on resources, reduced manning and in some cases, medical discharge [1,2,5,6,22-24].

Furthermore, the increased burden on the medical chain, temporary downgrade, placement on light duties and potential risk of subsequent medical discharge all impacts upon the supply of trained personnel to the wider British Army [1,2,5,25-29]. Consequently these injuries have been identified as a threat to organisational effectiveness and productivity and ultimately compromising operational capability [1,2,5,7,22,24].

As potentially career and therefore life changing events, in the physical domain but seen increasingly from a psychological perspective, MSKI can have significant impact on the individuals affected [1-7,10-11]. The associated costs represent

a significant financial consideration and therefore ultimately impact upon military budgets [1,2,5,6,27-30]. Although there is a strong global appetite to identify and implement injury prevention strategies, population specific data is limited and there firmly remains the need to identify effective interventions [7,14]. The accumulation of accurate and meaningful injury data is a prerequisite for identifying injury patterns and prior to determining the direction of subsequent interventions [1,2,5,7,21,24-30]. Injury surveillance data is fundamental to evaluation and refinement of service delivery which in turn underpins a continual commitment to health care governance whilst on-going service evaluation and quality improvement is an imperative reflected in the Infantry Training Centers' Mission statement [25]. The Army Recruitment Training Division (ARTD) is responsible for the external validation of the course as well as the monitoring of training outcomes. In addition, the ITC is subject to external military scrutiny from the Inspector General's Department whilst educational content, pastoral and welfare provision is assessed every two years by the Office for Standards in Education, Children's Services and Skills (OFSTED). Medical delivery is subject to biennial Health Care Governance Inspections.

This paper, serves to present retrospective trend analysis of the incidence and sub-classifications of 4,777 separate MSKI episodes referred to the Physiotherapy Department from a total recruit inflow of 12,501 over five consecutive training years (01 Apr 2012- 31 Mar 2017) at the Infantry Training Centre Catterick.

## Methods

This is a retrospective study in which injury data were collected for five consecutive years (April 2012 to March 2017). A single training year runs between 1st April and 31st March. The ITC Primary Care Rehabilitation Facility (PCRF) has maintained an injury data register. Administrative staff initiate data entering according to established causality categories;

- Injuries attributed directly to Infantry recruit training (Phase 1 & 2)
- Playing sport or in non-working time

Further data fields are presented in table 1.

The spread sheet is password protected and managed in accordance with Caldicott guidelines. The MSKI data for the last five training years, 2012-2017 were reviewed by physiotherapy management team for targeted trend analysis. Non-training MSKI such as those acquired from domestic causes for example road traffic accidents, weekend sports or not referral to the Physiotherapy Department were excluded. In addition, injuries reported by personnel on military short courses were not included in this analysis. This paper did not investigate inter-company injury patterns.

Each MSKI is presented as a new separate case. Repeat injuries within four weeks of initial presentation are recorded within the original recorded episode of care.

## Data Analysis

All MSKI referred to the PCRF were entered into the password protected database by the Departmental Clinical Administrator. The data were analysed descriptively, with 95% confidence interval (CI) by site, type, cause, rate and time of presentation. All data were checked independently by the Clinical Administrator as well as three senior members of the physiotherapy management team as to its accuracy prior to analysis. All MSKI data were considered relative to the total annual recruit inflow to ITC. All recruits entering ITC are nominally and numerically registered according to their allocated training Company. The baseline data of total number of recruit inflow for each regiment were retrieved from the Training, Administration and Financial Management Information System (TAFMIS) and were cross referenced and confirmed as accurate with those recruit intake figures recorded by ITC Training Development Cell (G7) and key statistical database for the School of Infantry (SCHINF). The injury data were extracted and presented for all individual recruits commencing the respective training years.

**Table 1:** Each MSKI is presented as a new separate case. Repeat injuries within four weeks of initial presentation are recorded within the original recorded episode of care.

Patient	Injury	Training	Rehab Summary
Service Number	Date of Injury	Week of Trg	Days in Physio
Unit (i.e. ITC)	Date presented to PCRF	Days out of Training	Weeks in Physio
Regt (i.e. Line Infantry, Para, Guards or Ghurkha)	Injury type (i.e. trauma, overuse).	Days in Rehabilitation Platoon	Number Physio appointments
Ethnicity	Injury site (i.e spine /hip/knee/ankle/foot)	Date of discharge	Weeks in Rehab Platoon
Gender	Pre-existing Injury status		Outcome (i.e Return to Training/Medical Discharge)
	Stress fracture site		
	Stress fracture diagnosis		
	Patient perceived cause injury		

## Results

4777 MSKI were referred to the PCRF from a total inflow of 12,501 recruit trainees over five consecutive training years at ITC. The incidence of all reported MSKI sustained by recruits undertaking the CIC varied annually, ranging from 32.5 (95% CI: 30.7-34.4%) to 52.4% (95% CI: 47.9-52.4%) representing a cumulative five year incidence of 38.2 (95% CI: 37.4-39.1%) (Table 2).

### MSKI rate

Table 2 presents the sub-classification of MSKI as a percentage of the annual MSKI incidence rate, considered as a percentage of recruit inflow over five consecutive training years at the ITC. Overuse excluding (non-stress fracture) MSKI represent a five year incidence rate of 23.9% (95% CI: 23.1-24.6%) of total recruit inflow. Traumatic injuries represent 8.8% (95% CI: 8.3-9.3%) whilst stress fractures alone represent 5.5% of inflow (95% CI: 5.14-5.9%). Pre-enlistment injuries equate to a five year cumulative incidence rate of 11.3% (95% CI: 10.7-11.8%). The pathophysiology of stress fractures is such that they may be considered as overuse in causation. Consequently, it may be considered appropriate to combine the incidence of stress fractures with overuse (non-fracture) MSKI. This combined sub-classification of overuse injuries represents a five year cumulative incidence of 29.4%, which equates in practical terms to nearly one in every three recruits sustaining an overuse injury.

### Site of injury

The most common reported site for training injuries was the lower limb. The specific hierarchical distribution of injury site for the last five training years are shown, with a 95% confidence interval, in figure 1. The figure illustrates that MSKI to the ankle and foot (25.1-35.3%) are the most prevalent followed by injuries to the knee (21.0-25.8%) during four consecutive training years, 2012 and 2016. However, in the 2016/17 training year, this was reversed. Notably, injuries to the hip increased (13.1%) whilst MSKI to the calf and shin were seen to reduce (12.0%) as compared to the previous four training years.

### Timing of injury

Table 3 illustrates the cumulative distribution of MSKI presenting to the PCRF for the last five consecutive training

**Table 2:** MSKI type as a percentage of total recruit inflow and referral to physio.

Type	2012/13 Inflow n=3521 % (95% CI)	2013/14 Inflow n=1922 % (95% CI)	2014/15 Inflow n= 2543 % (95% CI)	2015/16 Inflow n=2512 % (95% CI)	2016/17 Incidence rate Inflow n=2003	5 yr cumulative Incidence rate Inflow n= 12,501	95% Confidence Interval (CI)
Physio % (95% CI)	Physio (n= 1403) 39.9% (38.2-41.5%)	Physio (n=964) 50.2% (47.9-52.4%)	Physio (n=917) 36.1% (34.2-38.0%)	Physion=817 32.5% (30.7-34.4%)	Physio (n=674) 33.6%	Physio(n=4,775) 38.2%	37.4- 39.1%
Overuse	921 (26.2%)	551 (28.7%)	582 (22.9%)	520 (20.7%)	410 (20.5%)	2,984 (23.9%)	23.1-24.6%
Trauma	307 (8.7%)	242 (12.6%)	198 (7.8%)	178 (7.1%)	175 (8.7%)	1,100 (8.8%)	8.3-9.3%
Stress fracture	175 (5.0%)	171 (8.9%)	137 (5.4%)	119 (4.7%)	89 (4.4%)	691 (5.5%)	5.14-5.9%
*Pre-enlistment	411 (11.7%)	260 (13.5%)	308 (12.1%)	267 (10.6%)	162 (8.1%)	1,408 (11.3%)	10.7-11.8%

\*number of Pre-enlistment injury- could be spreads all 3 sub-classifications of injury.

years. The four year cumulative incidence (2012–2016) was observed as 9.5% 17.8% and 30.1% for weeks 4, 8 and 16 respectively. It is, however, noteworthy that for the most recent training year (2016/17) less MSKI presented at the first four (4.7%), eight (10.7%) and sixteen weeks (24.2%) of training.

### Reported Causation

Figure 2 describes reported injury causation. Notably, for the four consecutive training years (2012–2016) the MSKI presenting to the PCRf were attributed to a high impact fast pace marching with external load (backpack) called Tabbing. However, conversely traumatic injuries were observed to be the most prevalent identifiable cause of MSKI presented at the PCRf for the 2016/17 training year.

### MSKI resulting in Medical Discharge

Annual medical discharge due to MSKI is presented by sub-classification as a percentage of annual and cumulative

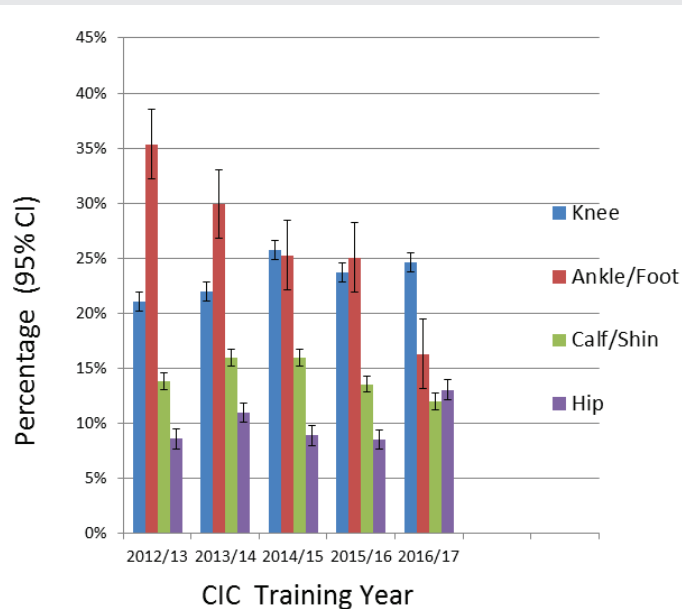


Figure 1: The Most Common Area of Injury (as a % of total injuries referred to physiotherapy with 95% Confidence Interval (CI)).

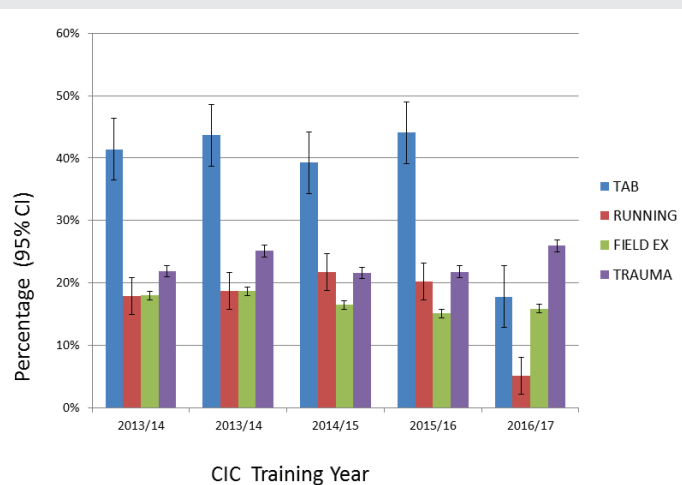


Figure 2: Attributed cause of injury (as a percentage of total injuries referred to physiotherapy with 95% Confidence Interval (CI)).

five year inflow (Table 4). A cumulative total of 7.1% (95% CI: 6.7–7.6%) of the five year total recruit inflow resulted in medical discharge. Sub-classification of injury type on medical discharge were observed as; overuse (non-fracture) (4.2%: 95% CI: 3.9–4.6%) followed by stress fractures (1.5%: 95% CI: 1.3–1.7%) and then trauma (1.4%: 95% CI: 1.2–1.6%). Conversely, the training year, 2016/17 saw a reduction in all MSKI related medical discharges, with MSKI attributed to traumatic incidents exceeding stress fracture as a singular cause of Medical discharge.

### Discussion

This study analyzed 4777 MSKI referred to the Physiotherapy Department from a total inflow of 12501 recruits over five consecutive training years between 01 April 2012 and 31 March 2017. The incidence of total reported injuries sustained by recruits undertaking the CIC varied annually between 32.5 to 52.4% of the total recruit inflow. This equates to a five year annual cumulative incidence of 38.2% with a 95% CI ranging from 37.4–39.1%. Perhaps reassuringly, these sets of injury data are similar to the values (8%–59%) reported across other military populations [1–9,14,15] and considerably lower than previous reported at the same institution (48.6%–58%) [2,16]. Similarly, a higher injury incidence (60%) was reported in a study of American recruits over a 12 week training period. However, professional accountability to meet both internal and external drivers of governance insists that opportunities to drive down injury incidence and enhance service delivery are constantly sought [1,17].

There is some variation in the pattern of annual injury incidence over the last five training years. It is recognized that MSKI are multi-factorial in origin and as such it may be tenuous to attribute a single intervention to either increments or reductions in incidence. However, it may be suggested that targeted injury prevention strategies may have contributed to the reduced injury incidence in training years 2013/14 and 2015/16. These strategies included the reduction in unnecessary “junk” mileage previously incurred by the recruits transiting across the camp between training serials as well as the introduction of nutritional training supplements. Similarly, the introduction of a variety of new military boots in April 2013, may have contributed to a reduction in ankle and foot related during this period. Equally, it is interesting that prior to the introduction of new military footwear the highest recorded incidence of injuries to the ankle/foot were recorded in 2012/13 (35.3%) and 2013/14 (29.3%) (Figure 1). These injuries reduced considerably (16.3%) in training year 2016/17. Similarly, injuries to the calf and shin reduced from a high of 16% in 2014/15 to a low of 12% in 2016/17. These patterns are comparable with previous studies [1,2,15]. Whilst Brushoj et al. [14], found the highest incidence of injuries occurred at the knee and shin. Conversely, in this study, injuries to the hip were found to increase from a low of 8.6% in 2012/13 to a high of 13.1% in 2016/17. These observations in injury patterns may in part be explained by changes made to the content, context and delivery of training in 2016/17. It is interesting to note that the prevalence of knee injuries at ITC (Figure 1), reflects

**Table 3:** Cumulative MSKI incidence as a percentage of total inflow by week of training.

Week of Training	2012/13 *n=3521 % (n)	2013/14 *n=1922 % (n)	2014/15 *n=2543 % (n)	2015/16 *n=2512 % (n)	4 yr Cumulative Incidence *n=10498 % (n)	2016/17 *n=2003 % (n)
4	10.1% (357)	11.3%(218)	9.9%(251)	6.9%(174)	9.5% (1000)	4.7% (94)
8	18.9%(666)	21.5%(413)	17.9%(433)	14.1%(355)	17.8% (1867)	10.7%(215)
16	31.0%(1091)	38.9%(748)	28.1%(715)	24.3%(611)	30.1% (3165)	24.2%(485)

\*Total inflow

**Table 4:** MSKI resulting in Medical Discharge as a percentage of injury type.

Type	2012/13 n=3521 % (n)	2013/14 n=1922 % (n)	2014/15 n=2543 % (n)	2015/16 n=2512 % (n)	2016/17 n=2003 % (n)	5 Yr Cumulative Incidence n=12,501 % (n)	95% Confidence Interval (CI)
Stress Fracture	1.4 (48)	2.3% (45)	1.7% (42)	1.5% (37)	0.6% (12)	1.5% (184)	1.3-1.7%
Overuse (non-fracture)	4.6% (162)	5.0% (96)	4.1% (105)	4.5% (112)	2.6% (52)	4.2% (527)	3.9-4.6%
Trauma	1.6% (57)	1.7% (33)	1.4% (35)	1.2% (29)	0.8% (17)	1.4% (172)	1.2-1.6%
Total MD	7.8% (276)	9.1% (174)	7.2% (182)	7.1% (178)	4.0% (81)	7.1% (891)	6.7-7.6%

findings across the literature that between 20 and 40% of military training injuries are reported to occur at the knee [19].

Overuse (non-stress fracture) lower limb injuries have consistently been the most common sub-classification of MSKI in the recruit population at ITC with a five year cumulative incidence of 23.9% (95% CI: 23.1-24.6%). These patterns are similar to those observed for overuse injuries among other military populations [1,2,6,14-16]. Stress fracture, a pathological response to the body's inability to efficiently dissipate load, may also be considered as an overuse injury. Stress fractures were observed to present a five year cumulative incidence of 5.5% (95%CI: 5.1-5.9%). Consequently, all overuse MSKI represent a five year cumulative incidence of 29.4%. Insidious in onset, generic, formulaic approaches to address the multi-factorial cause of these injuries have rarely been effective, whilst strategies specifically addressing the cause and mechanism of injury have shown to be the most effective [1,10]. Traditionally, a reduction in the total volume of exercising mileage has been the first considered response. A study of US Marine recruits showed that a 40% (22 mile) reduction in running distance was associated with a 54% reduction in stress fracture incidence with no significant change in run times [10]. Similar outcomes were obtained with Australian Army recruits, where running was replaced with a graduated programme of loaded foot marches resulting in a reduction of all lower limb injuries by 43% and more specifically a reduction in knee injuries by 53% [10].

Stress fractures, a pathological consequence of the body's inability to dissipate load are considered as a sub-classification of overuse injury. Lower limb stress fracture rates are reported to range globally from 0.8 to 6.9% across initial entry military training populations [1,2,6,17,27,28]. Although it is encouraging that a reduction in annual incidence from a peak of 8.9% down to 4.4% (of total recruit inflow) has been observed at ITC, focus must be maintained on addressing all sub-classifications of overuse MSKI. The incidence of traumatic injuries may

be mitigated through education and sound risk assessment. However, although perhaps considered an unavoidable bi-product of arduous physical activity every effort must also be made to reduce their occurrence. A five year cumulative incidence of 8.8% (95% CI: 8.3-9.3%) of the total recruit inflow for traumatic injuries was observed in comparison to 23.9% (95% CI: 23.1-24.6%) for all overuse injuries.

Sustained high impact activities have consistently been attributed by recruits as the most common cause of all MSKI at ITC. This is in keeping with a plethora of international studies which acknowledge these activities as potentially modifiable extrinsic factors for overuse MSKI in both military and civilian populations [1-10,14,17,27-30].

As shown in table 3, as much as 21.5% of total inflow presented with an MSKI by week eight of training. This is similar to observations made in previous studies in which the initial weeks of training were identified as an important area in term of injury prevention [1,2,15,16]. The potential for variation and inconsistency in volume, type, intensity, frequency and consistency of physical activity conducted by recruits prior to enlistment is likely to have considerable bearing on physical conditioning, fitness and robustness [2,6,7]. Notably, a lack of exposure to physical activity, associated poor baseline fitness levels as well as inadequate preparation prior to commencing military training have all been identified as risk factors for development of MSKI [1-8]. In addition, to the physical challenges previous studies have suggested that recruits are additionally susceptible to mental stresses due to the impact of re-locating from their previous civilian domestic environment, undergoing arduous training within an unfamiliar environment, a sudden restriction in social freedom as well as periods of sleep deprivation [2,6,31]. These stresses to the new recruit are believed to significantly contribute to the incidence of MSKI within the early part of infantry training [6,31].

This re-distribution of injury incidence in the 2016/17 training year may be, in part, attributed to the introduction of a revised approach to training which in turn might have had a favourable impact on the matching of applied training load to the physical capacity of the recruit. Essentially, the recruits remained in training longer before sustaining an MSKI and consequently had a longer opportunity to develop physically without being distracted by injury. This is particularly important for a young adult population who are subject to increased exposure to arduous physical activity whilst still physiologically maturing.

As per table 2, an incidence of 23.9% of total inflow presented with an overuse MSKI. This equated to 77% of all injuries presenting to the Physiotherapy Department, described as either overuse fracture or non-fracture in nature. As mentioned above, in spite of limited knowledge regarding recruits pre-enlistment fitness, as well as the quality, quantity and nature of their previous physical activity levels, let alone their genetic profile it is reasonable to suggest that, from a purely physiological perspective, those individuals reporting overuse MSKI found difficulty coping with the content, type, intensity and volume of the training.

Ultimately, this indicates a mismatch in physical capacity versus applied tissue loading and suggests a requirement to address this balance throughout the course but particularly during the first half of training. Stress fractures and all other (non-stress fracture) overuse injuries are the sub-classification of MSKI which have the highest attributable incidence of subsequent medical discharge (Table 4). This further re-iterates the impact that overuse MSKI has had not just on the medical services and training teams but also on the wastage of injured infantry recruits at ITC. Progressive physical loading is recognised as a key component of effective programming from the perspective of both injury mitigation as well as overall development of optimal physical performance. Effective strategies designed to address the prevention of these MSKI would therefore have far reaching effect.

It has been reported that careful modification of risk factors can reduce the incidence of all injuries. Specific consideration of the environment (terrain and climate) along with progressive increments in distance, intensity and frequency accompanied by adequate periods for rest and recovery have been advised [8,18-20,23]. This is particularly relevant to those recruits who sustain overuse injuries and serves as a recommended area for consideration in future reviews of the content of infantry training at ITC.

In addition, the five year cumulative incidence of pre-enlistment injuries (11.3%: 95% CI: 10.7-11.8%) represents a 5 year cumulative incidence of 29.5% among all injuries presenting to the PCRf. This suggests the need for further data analysis in order to investigate the relationship between previous injury, performance and training outcomes. The results of a follow up investigation may have implications on pre-enlistment medical screening criteria.

The prevalence of training injuries observed at ITC is not unique to the British Army. The observations made from

this five year analysis are consistent with those reported across other NATO military populations [1-2,10,17,18,20]. The responsibility to investigate and address the cause is firmly recognised. Indeed, a sense of urgency is reported, with strong recommendations that proportional attention should be therefore dedicated to the prevention of these potentially reducible injuries [1-10,22,26,30]. This data has served as a basis for the introduction of a comprehensive service evaluation which in turn provided justification for the introduction of an integrated injury prevention strategy-Project OMEGA [7]. If successful, this initiative could have a favorable impact on injury incidence rates and the associated wastage not least the time lost to training, the accompanying financial implications and ultimately the impact on operational effectiveness. Furthermore, it may represent a mechanism to identify areas for potential improvement to the content and delivery of physical development training within infantry training environments.

## Conclusion

This retrospective study highlights the magnitude and impact of MSKI injuries and subsequent attrition on the British Army. It is imperative that meaningful interpretation of data surveillance is used to guide the application of evidence based interventions in order to reduce the incidence of potentially avoidable MSKI. Retrospective analysis of five years of injury data provided baseline data from which a better understanding of injury patterns may be made. The data reported for the 2016/17 training year, represents the lowest injury incidence. The findings in this paper suggest that Project OMEGA may have positively contributed to the reduction of all MSKI incurred during infantry recruit training. In order to assess the impact of Project OMEGA further data analysis is recommended.

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## Contributors

RH and JS conceived the study, analysed and interpreted data, drafted and critically review the manuscript, and JC involved in the raw data collection and proof read the final version of the manuscript. All authors have read and approved the final version of the manuscript.

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