Original Contribution

Acute Myocardial Infarction in Scottish Military Veterans: A Retrospective Cohort Study of 57,000 Veterans and 173,000 Matched Nonveterans

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Few studies of veterans have examined cardiovascular disease as the primary outcome, other than in relation to specific conflicts or hazards. To assess the long-term risk and prognosis of acute myocardial infarction (AMI) in United Kingdom veterans from a broad range of military backgrounds and experience, we conducted a retrospective cohort study of 57,000 veterans resident in Scotland and 173,000 civilians matched on age, sex, and area of residence. Cox proportional hazards models were used to compare the risks of fatal/nonfatal AMI overall, by sex, and by year of birth, adjusting for the potentially confounding effect of socioeconomic status, and to compare rates of case-fatality following AMI at 30-day, 1-year, and 5-year follow-up. Over a mean follow-up period of 29 years between 1981 and 2012, a total of 2,106 (3.8%) veterans experienced an AMI as compared with 5,261 (3.1%) nonveterans (hazard ratio = 1.22, 95% confidence interval: 1.16, 1.29; \( P < 0.001 \)). There was an increased risk of AMI among veterans born in 1945–1959 but not among those born from 1960 onward. Case-fatality was lower among veterans at 30-day, 1-year, and 5-year follow-up. We conclude that health behaviors such as smoking may have increased the risk of AMI in older veterans but that younger veterans have benefited from in-service health promotion initiatives.

Abbreviations: AMI, acute myocardial infarction; military personnel; retrospective cohort studies; risk factors; smoking; veterans

Risk factors for acute myocardial infarction (AMI) include genetic, environmental, and lifestyle factors. The latter include smoking, physical inactivity, and obesity (1). Military personnel present a mixed picture for cardiovascular risk. There is a “healthy soldier effect” in that only persons who are physically fit and in good physical and mental health are selected for military service, and there is evidence that this persists into a “healthy veteran effect,” although (in common with the “healthy worker effect”) it attenuates over time (2, 3). Paradoxically, military personnel and veterans are more likely to exhibit unfavorable health behaviors than those who have never served (4). Serving personnel benefit from a higher level of physical activity, but they have consistently been shown to have a higher prevalence of smoking than their civilian peers (5), although the difference has varied over time (6). Diet during military service is often relatively high in energy, in accordance with the needs and choices of a predominantly young, physically active population (7, 8). No data on in-service obesity were available until recently, when a study demonstrated that military personnel under the age of 35 years had a lower prevalence of obesity than civilians, although there were no differences in older personnel (9). In recent years, military health promotion initiatives have endeavored to inculcate a culture of healthy eating (10), exercise, tobacco avoidance, and weight management, not only to improve fitness during service but also to protect health in later life. Because the majority of serving United Kingdom military personnel are under age 25 years, the effectiveness of some of these measures has been tempered by the known difficulties of influencing health behavior in young people (11). Furthermore, military personnel are more likely to engage in risk-taking behavior (12), although...
physical exercise and obesity avoidance are in keeping with the military ethos (13).

In spite of a large number of published studies on the health of veterans, few have examined cardiovascular disease as a primary outcome. This is surprising, since United Kingdom studies carried out in the early 1980s highlighted increased cardiovascular risk among serving military personnel as compared with the civilian population (14, 15). There have been a number of studies conducted on cardiovascular outcomes in military veterans of specific conflicts or veterans who have been exposed to hazardous agents (16, 17), but there is a paucity of studies examining long-term risk of cardiovascular events in a general veteran population for assessment of the net effect of all aspects of military service.

The Scottish Veterans Health Study enabled us to examine the incidence of AMI in a large cohort of military veterans, irrespective of length of service or exposure to conflict, in comparison with civilians with no record of service.

METHODS

Study population

The Scottish Veterans Health Study is a retrospective cohort study that comprises all 56,570 military veterans born between 1945 and 1985 who were registered with the National Health Service (NHS) Scotland both prior to military service and following discharge, as well as a 3:1 comparison group of 172,753 persons with no record of military service who were matched to the veterans by age, sex, and residential postcode sector (mean population 5,000). After data cleaning, 56,205 (99.4%) veterans and 172,741 (99.9%) nonveterans were included in the analysis. Participants were identified via their electronic NHS registration records, which provided demographic information as well as the dates of entering and leaving military service. The records were linked, at the individual level, to routine hospital admissions data, which cover all admissions to acute-care hospitals in Scotland (Scottish Morbidity Record 1), and to death certificates to obtain information on first episodes of fatal or nonfatal AMI (clinically coded as International Classification of Diseases, Tenth Revision (ICD-10), code I21 and International Classification of Diseases, Ninth Revision (ICD-9), code 410* at any position in the record) and all-cause mortality. Information was available for follow-up events that occurred between January 1, 1981, and December 31, 2012, inclusive. The data extract was pseudo-anonymized, and approval for the study was granted by the Privacy Advisory Committee of the Information Services Division of NHS Scotland.

There are 6,505 data zones in Scotland, based on postcode of residence, with a mean population of 800. The Scottish Index of Multiple Deprivation for each data zone is derived from information on income, employment, health, education (including skills and training), housing, crime, and access to services (http://www.scotland.gov.uk/Topics/Statistics/SIMD). We used the Scottish Index of Multiple Deprivation to derive quintiles of regional socioeconomic status (SES) for the Scottish population, ranging from 1 (most deprived) to 5 (least deprived). We used postcode of residence to categorize the cohort participants according to these quintiles. Individual-level SES measures were not available to us. For the purposes of geographical analysis, we used Health Board regions and amalgamated the regions to increase statistical power. We defined the predominantly urban Health Board regions of the north central belt as Argyll and Clyde, Fife, Forth Valley, and Tayside; the regions of the south central belt as Ayrshire and Arran, Glasgow, Lanarkshire, and Lothian; and the more rural borders, highlands, and islands as the Borders, Dumfries and Galloway, Grampian, Highland, Orkney, Shetland, and Western Isles areas. No data on individual risk factors were available, but data on dispensed prescriptions for nicotine replacement therapy were available from 2009 onward from the NHS Prescribing Information System.

Statistical analysis

Cox proportional hazards models were used to examine the association between veteran status and cumulative risk of AMI, using age as the time-dependent variable and age at first AMI or death (if no AMI) as the censoring time. Cox proportionality assumptions were tested using Stata estat phtest, based on Schoenfeld residuals (18). The a priori rejection level for the P values for the hazard ratios was set at 0.05. The analyses were run univariately and then repeated with adjustment for the potentially confounding effect of regional SES quintile. We repeated the analyses after stratifying the data by year of birth, grouped into 5-year bands to increase statistical power, in order to examine potential birth cohort effects and after stratifying the data by geographical region in order to examine potential regional variations. Cox proportional hazards models were used to compare the risks of death between veterans and nonveterans within 30 days, 1 year, and 5 years of AMI. All analyses were performed using Stata, version 12.1 (StataCorp LP, College Station, Texas).

RESULTS

Basic characteristics

Of the 56,205 veterans included in the analysis, only 5,235 (9.3%) were women. Overall, 22,026 (39.2%) lived in the predominantly urban Health Board regions of the central belt, 19,738 (35.1%) in the north central belt, and 14,234 (25.3%) in the more rural border, highland, and island regions (Table 1). The area of residence of the remaining 207 (0.4%) veterans was not recorded. Of the 55,831 veterans for whom a deprivation score was recorded, only 15.2% were in the least deprived quintile. The median duration of service of the veterans was 6.3 years. The mean follow-up period was 29.3 years, giving us a total of 6.7 million person-years of follow-up among veterans and nonveterans combined. Characteristics of the cohort are shown in Table 1.

Risk of AMI

Overall, both incidence of AMI and risk of AMI were higher among veterans than among nonveterans (Figures 1 and 2). Over the follow-up period, 2,106 (3.8%) veterans experienced an AMI as compared with 5,261 (3.1%) nonveterans (hazard ratio = 1.22, 95% confidence interval (CI): 1.16,
The difference remained after adjustment for regional SES (adjusted hazard ratio = 1.18, 95% CI: 1.12, 1.24; \( P < 0.001 \)). The overall mean age at first AMI was 51 years for both veterans and nonveterans. Testing for nonproportionality of the hazards was nonsignificant. The association between incidence of AMI and veteran status was consistent across the geographical regions but reached statistical significance only in men (Table 2). Analysis by birth cohort showed an increased risk of AMI among veterans born between 1945 and 1959 in comparison with nonveterans, but no difference between veterans and nonveterans for those born from 1960 onward (Figure 3). The birth cohort effect remained when results were adjusted for the potentially confounding effect of regional SES (Table 2).

**Case-fatality**

Following an AMI, 30-day case-fatality was significantly lower among veterans (univariate hazard ratio = 0.87, 95% CI: 0.76, 0.98; \( P = 0.028 \)). One-year and 5-year case-fatality rates were also lower among veterans (Table 3). The differences were similar after adjustment for regional SES. In subgroup analysis, the effect was confined to older veterans born prior to 1960. When analyzed geographically, the lower 30-day case-fatality in veterans was seen only in the central belt and not in the more rural highlands, islands, and borders (Table 4).

**Nicotine replacement therapy**

Older veterans (born in 1945–1959) who had experienced an AMI were more likely to have received a prescription for nicotine replacement therapy than nonveterans (adjusted odds ratio = 1.25, 95% CI: 1.06, 1.47; \( P = 0.009 \)). For younger veterans born from 1960 onward, there was no significant difference in the likelihood of receiving a prescription for nicotine replacement therapy after an AMI (adjusted odds ratio = 1.07, 95% CI: 0.77, 1.49; \( P = 0.697 \)).

**DISCUSSION**

**Main findings**

The results of this study demonstrated that older United Kingdom military veterans (those born in 1945–1959) were at increased risk of AMI compared with civilians with no record of military service, after matching for age, sex, and

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**Table 1.** Characteristics of a Cohort of Veterans and Age-, Sex-, and Residential Area-Matched (3:1) Nonveterans, Scottish Veterans Health Study, 1981–2012

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Veterans ((n = 56,205))</th>
<th>Nonveterans ((n = 172,741))</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. %</td>
<td>No. %</td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South central belt</td>
<td>22,026 39.2</td>
<td>71,579 41.4</td>
</tr>
<tr>
<td>North central belt</td>
<td>19,738 35.1</td>
<td>57,872 33.5</td>
</tr>
<tr>
<td>Borders, highlands, and islands</td>
<td>14,234 25.3</td>
<td>43,269 25.0</td>
</tr>
<tr>
<td>Missing data</td>
<td>207 0.4</td>
<td>21 &lt;0.1</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>50,970 90.7</td>
<td>152,038 88.0</td>
</tr>
<tr>
<td>Female</td>
<td>5,235 9.3</td>
<td>20,703 12.0</td>
</tr>
<tr>
<td>Birth year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1945–1949</td>
<td>8,194 14.6</td>
<td>24,867 14.4</td>
</tr>
<tr>
<td>1950–1954</td>
<td>10,052 17.9</td>
<td>28,856 16.7</td>
</tr>
<tr>
<td>1955–1959</td>
<td>11,463 20.4</td>
<td>32,706 18.9</td>
</tr>
<tr>
<td>1960–1964</td>
<td>10,392 18.5</td>
<td>31,651 18.3</td>
</tr>
<tr>
<td>1965 onward</td>
<td>16,104 28.6</td>
<td>54,661 31.7</td>
</tr>
<tr>
<td>Quintile of socioeconomic status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (most deprived)</td>
<td>11,880 21.3</td>
<td>34,116 19.8</td>
</tr>
<tr>
<td>2</td>
<td>12,228 21.9</td>
<td>35,279 20.5</td>
</tr>
<tr>
<td>3</td>
<td>11,882 21.3</td>
<td>36,454 21.1</td>
</tr>
<tr>
<td>4</td>
<td>11,373 20.4</td>
<td>36,544 21.2</td>
</tr>
<tr>
<td>5 (least deprived)</td>
<td>8,468 15.2</td>
<td>29,971 17.4</td>
</tr>
</tbody>
</table>

\( ^{a} P < 0.001 \) for all comparisons (\( \chi^2 \) test for homogeneity of odds).

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**Figure 1.** Incidence of acute myocardial in Scottish veterans and nonveterans, by year of birth, Scottish Veterans Health Study, 1981–2012.

**Figure 2.** Cumulative hazard of acute myocardial infarction (AMI) by veteran status (Nelson-Aalen plot), Scottish Veterans Health Study, 1981–2012. Shaded areas, 95% confidence intervals.
geographical region and after adjustment for regional SES. The risk of AMI among younger veterans (those born from 1960 onward) did not differ significantly from the risk experienced by nonveterans. Compared with age-matched nonveterans, older veterans had better short-term and medium-term survival following AMI.

**Interpretation**

Increased cardiovascular risk among older veterans has been described in other countries, although the picture is inconsistent. In a study of long-term mortality among Australian veterans of the 1951 Korean War, Harrex et al. (19) reported increased mortality from ischemic heart disease among those who had served in the Army and Navy but not among former Air Force personnel. By contrast, Johnson et al. (20) found no difference in coronary heart disease events between either combat veterans and nonveterans or noncombat veterans and nonveterans among men an average of 36 years after entry into service during the era of either World War II, the Korean War, or the Vietnam War. Brown (5) used data from the US Centers for Disease Control and Prevention’s Behavioral Risk Factor Surveillance System to derive an age-adjusted prevalence of self-reported coronary heart disease of 6.5% among US male veterans as compared with 5.5% among male nonveterans, with corresponding

### Table 2. Association Between Veteran Status and Risk of Acute Myocardial Infarction, Overall and by Geographical Region, Sex, and Birth Year (Cox Proportional Hazards Model), Scottish Veterans Health Study, 1981–2012

<table>
<thead>
<tr>
<th></th>
<th>Univariate</th>
<th>Multivariatea</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HR 95% CI</td>
<td>P Valueb</td>
</tr>
<tr>
<td>Overall</td>
<td>1.22</td>
<td>1.16, 1.29</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South central belt</td>
<td>1.33</td>
<td>1.23, 1.44</td>
</tr>
<tr>
<td>North central belt</td>
<td>1.33</td>
<td>1.21, 1.45</td>
</tr>
<tr>
<td>Borders, highlands, and islands</td>
<td>1.32</td>
<td>1.18, 1.48</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.21</td>
<td>1.15, 1.27</td>
</tr>
<tr>
<td>Female</td>
<td>0.90</td>
<td>0.62, 1.29</td>
</tr>
<tr>
<td>Birth year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1945–1949</td>
<td>1.33</td>
<td>1.22, 1.45</td>
</tr>
<tr>
<td>1950–1954</td>
<td>1.27</td>
<td>1.15, 1.39</td>
</tr>
<tr>
<td>1955–1959</td>
<td>1.21</td>
<td>1.08, 1.35</td>
</tr>
<tr>
<td>1960–1964</td>
<td>0.99</td>
<td>0.83, 1.17</td>
</tr>
<tr>
<td>1965 onward</td>
<td>0.88</td>
<td>0.69, 1.14</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; HR, hazard ratio.

a The multivariate model adjusted for regional socioeconomic status (Scottish Index of Multiple Deprivation quintile).

b P for Cox proportional hazards ratio.

### Table 3. Association Between Veteran Status and 30-Day, 1-Year, and 5-Year Case-Fatality Following Acute Myocardial Infarction (Cox Proportional Hazards Model), Scottish Veterans Health Study, 1981–2012

<table>
<thead>
<tr>
<th>Case-Fatality Measure</th>
<th>Univariate</th>
<th>Multivariatea</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HR 95% CI</td>
<td>P Valueb</td>
</tr>
<tr>
<td>30 days</td>
<td>0.87</td>
<td>0.76, 0.98</td>
</tr>
<tr>
<td>1 year</td>
<td>0.88</td>
<td>0.78, 1.00</td>
</tr>
<tr>
<td>5 years</td>
<td>0.87</td>
<td>0.77, 0.97</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; HR, hazard ratio.

a The multivariate model adjusted for regional socioeconomic status (Scottish Index of Multiple Deprivation quintile).

b P for Cox proportional hazards ratio.
Hotopf et al. (24) have demonstrated that combat is associated with posttraumatic stress disorder and men (22). An association between coronary heart disease and posttraumatic stress disorder is recognized (23), compared with 6.4% among nonveterans. Elder et al. (21) found that combat overseas predicted physical decline or death in the 15 years following World War II but had no information on diagnoses. Most of those studied were officers, which limited the value of the study, since officers have better cardiovascular health than noncommissioned men (22). Despite the high prevalence of “Soldier’s Heart” (chest pain and palpitations upon exertion (also termed da Costa’s syndrome or effort syndrome (25)), originally believed to indicate heart disease but now considered to have been of noncardiac origin (26)) during the late 19th and early 20th centuries, there was no evidence of a high incidence of coronary heart disease in the United Kingdom Armed Forces until the 1960s; only 28 cases were admitted to the Queen Alexandra Military Hospital in London, which was then the main referral hospital for the Army, between 1958 and 1961 (27). Thereafter, the incidence increased, and between 1968 and 1977 there were 294 deaths from ischemic heart disease among serving soldiers (28). Tri-Service data record the deaths of 605 men from ischemic heart disease between 1973 and 1984, with another 41 deaths for which it was considered to be contributory (29). Around 1990, cardiovascular mortality in soldiers fell sharply over a period of about 5 years, from an annual average of 16.0 per 100,000 in 1973–1990 to 4.8 per 100,000 in 1994–2011 (Army Health Unit, unpublished data, 2013; calculated from historical United Kingdom military health statistics), although there is evidence that it was already declining by the mid-1980s, especially among officers (29). These reductions have never been explained. In our study, the subgroup of veterans born between 1945 and 1959 was at increased risk of AMI. Most of these veterans commenced their adult service between 1963 (immediately after the discontinuation of the compulsory military conscription (National Service) that followed World War II) and 1977. Since their median duration of service was 6.3 years, the majority had been discharged from the Armed Forces by 1985, having served during the period of highest incidence of in-service AMI.

Exposure to tobacco smoke may be a factor in the increased risk of AMI among older veterans. The INTER-HEART study showed current smoking to be associated with an increased risk of nonfatal AMI (odds ratio = 2.95, 95% CI: 2.77, 3.14), while an increased risk persisted beyond 20 years after cessation in former smokers (odds ratio = 1.87, 95% CI: 1.55, 2.24) (30). Doll et al. (31) demonstrated increased mortality from ischemic heart disease in both current and former smokers. Secondhand exposure to tobacco smoke has also been shown to be associated with an increased risk of coronary heart disease (relative risk = 1.25, 95% CI: 1.17, 1.32) (32). The prevalence of smoking in Britain is reported to have been higher among military personnel than among civilians since World War I (33, 34), with a prevalence of approximately 80% among young soldiers in the early 1960s. The prevalence of smoking in the United Kingdom Armed Forces fell throughout the 1980s, and by 1989 only 45% of 18-year-old soldiers smoked (6). A study conducted in 2004.
showed that 30% of Armed Forces personnel were smokers as compared with 33% of civilians, although the authors noted that being in the Army (in comparison with the other services), being of lower rank, and having lower educational attainment were associated with being more likely to smoke (35). In our study, veterans born prior to 1960 were more likely to receive nicotine replacement therapy following AMI, suggesting that smoking was likely to have been a contributory factor in this older group.

Combat is a risk factor for posttraumatic stress disorder, which in turn is a risk factor for cardiovascular disease (24, 25). The late 1970s and 1980s saw no reduction in British military operational commitments as compared with the 1960s, whether they involved warfighting, peacekeeping, or peace enforcement; rather, the reverse was the case, with the Borneo (1962–1966) and Aden (1963–1967) emergencies giving way to Northern Ireland (1969–2007), the Falklands War (1982), the First Gulf War (1991), Bosnia (1992–1996), Rwanda (1994), Angola (1995), Kosovo (1999), Sierra Leone (2000), Afghanistan (from 2001 onward), and Iraq (2003–2009). Therefore, although data which would enable us to quantify the number of veterans in our data set who were involved in combat during this period are not available to us, British military history provides no evidence to support a reduction over time. We postulate that combat is unlikely to explain the trend seen in our study and that smoking is a better fit; with a high prevalence of smoking in recruits (6), exposure is likely to be independent of length of service, and the overall prevalence of smoking has declined.

Secondhand tobacco smoke exposure may also have played a role. Historically, junior servicemen lived in barracks rooms of up to 30 men with no restrictions on indoor smoking, so that even nonsmokers were exposed to high levels of environmental tobacco smoke. Over time, barracks rooms were reduced in size (36), with 4-man rooms becoming the norm, and a ban on indoor smoking on military premises came into force in 2006 (37). It is therefore plausible that a reduction in exposure to tobacco smoke was a factor in the decline of excess AMI risk with year of birth, but other factors, such as increasing exercise and fitness levels among military personnel, may also have played a role. There has been an increasing emphasis on physical fitness and health promotion in the Armed Forces since 1978, when the British Army introduced a mandatory basic fitness test based on a timed 3-mile (4.8-km) run (38). Persons born from 1960 onward joined the Army after that date and experienced increased exercise levels, particularly running, compared with their predecessors. The Royal Navy and Royal Air Force did not bring in fitness tests until much later, but the Army has always been the largest service, and with historically high smoking rates, the Army may be the main contributor to cardiovascular risk in United Kingdom veterans.

In an early study of US veterans, Beard et al. (39) examined the 5-year case-fatality rate after AMI as compared with the expected mortality of the general population and found it to be higher, but did not undertake comparison with nonveterans following AMI. In our study, veterans experienced a lower case-fatality following AMI. This may have been due in part to a persistence into civilian life of the pattern of seeking prompt medical care for any symptoms, since serving personnel are required to report all ill health to a health-care provider (40). In subgroup analysis, survival was significantly better only among veterans living in the more urban central belt, who have easier access to health care than veterans in rural areas, and among those who served when in-service AMI incidence was highest. Therefore, their awareness of the need for prompt action may be greater. Alternatively, it may reflect residual higher fitness levels in veterans (41) or a lower prevalence of comorbidity owing to selection bias in a group who have previously had to meet military health standards.

Strengths and limitations

The strengths of the present study are that it was based on a large cohort covering the whole of Scotland, with almost 30 years follow-up. Many of the participants had reached the peak age for AMI incidence by the end of the follow-up period. It included both fatal and nonfatal AMI, and since the diagnosis of AMI was taken from hospital admission and death records, data were likely to have been both reliable and reasonably complete with regard to events occurring within Scotland. Hospital data in Scotland are subject to rigorous data-quality monitoring; in 2010–2011, a standard of 97.3% accuracy and 97.4% completeness was recorded for ischemic heart disease as a main condition (42). Data quality for death certification is not formally evaluated, but in a small unpublished study, concordance between statutory death registration data and NHS data was high (43). The number of events occurring outside of Scotland could not be quantified. The use of record linkage to analyze individual-level data directly derived from health records allowed us to use a robust cohort study design (44). We were able to match or adjust the results for confounders, including sex and regional SES. It was possible to perform subgroup analysis by sex and area of residence, and the ability to study sequential birth cohort effects adds to the existing literature on veterans.

Limitations of the study include possible loss to follow-up of subjects migrating away from Scotland, for whom no data were available, and the lack of any follow-up data prior to January 1, 1981—although, because the oldest members of the cohort were only aged 36 years on that date, the number who had suffered an AMI by then was probably small. The Information Services Division of NHS Scotland reported a standardized incidence of 34.6 per 100,000 males under age 45 years in 2011–2012, as compared with 649.4 per 100,000 males aged 45–64 years (45). For the veterans, we could not link our data to in-service health records; thus, any AMI experienced during service will not have been captured. Hospital records include information on diseases and procedures but not on personal lifestyle risk factors. Therefore, nicotine replacement therapy was used as a proxy for the relative likelihood of smoking. Veterans with Reserve service only could not be identified from NHS records and would have been included among the nonveterans. Any effect of this would have been underestimation of observed differences between veterans and nonveterans. Data on combat exposure in the veterans were not available. No information was available on the service to which a veteran had belonged (Army, Royal Navy, or Royal Air Force). Rates of smoking are known from

other studies to differ between the services, with Royal Air Force personnel smoking less than those in the other two services (46). The difference was confined to males; female veterans’ experience of AMI did not differ from that of non-veterans. The small number of cases in this subgroup may have provided insufficient statistical power to demonstrate a difference. Anecdotally, servicewomen were less likely to smoke than servicemen during the early period covered by this study, although no formal data were reported.

We conclude that veterans born between 1945 and 1959, who served in the Armed Forces in the 1960s, 1970s, and early 1980s when the incidence of in-service AMI was highest, have carried an increased risk of AMI into their postdischarge lives. This may be due to historical patterns of health-related in-service behaviors, especially smoking, which may also have persisted into civilian life. There is no increased risk of AMI in younger veterans, who are less likely to have been smokers and more likely to have been physically fit during service. These findings provide justification for targeting the control of cardiovascular risk factors, especially smoking, toward older veterans.

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B.P.B. is a British Army veteran.

REFERENCES


