

Are RAF Regiment Gunners Sustaining Noise-induced Hearing Loss as a Result of Combat Operations?

Dissertation submitted for MFOM
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Scope

- The aim of the audit.
- The context. The role of RAF Regiment and patterns of noise exposure
- Hearing protection and surveillance.
- The study method.
- The results.
- Conclusion and recommendations.

The Aim

- To audit the occupational hearing loss as measured by audiometry in RAF Regiment Gunners since recruitment.
 - Who?
 - What?
 - Where?
 - When?
 - Why?
 - How much?

Who are the RAF Regiment?

- Force Protection: The aggressive defence of RAF assets.
- 7 Field Sqns of 150-160 men. On deployment 1 x Field Sqn to patrol each airfield.
- Foot and mechanized patrols, MERT close support, Joint operations.
- Patrol as 8 man Rifle Sections.



RAF Regiment Operational Tempo.

- The highest since WWII.
- Deploying for 6/12 with 12/12 between
- 3/12 pre-deployment training (PDT).
- Rifle and Support Weapons Sections.



What noise exposure on PDT/ Ops?

- Weapon Noise Levels (Max)
- .50 cal MG 153dB
- SA80 161 dB
- MP5 SMG 158 dB
- GPMG 169 dB
- 81mm mortar 179 dB
- 60mm mortar 185 dB

(Surg Cpt Brown and US Army Center for Health Promotion and Preventative Medicine)



What noise exposure on PDT/ ops?

- CH-47D Chinook 102dB
- Bulldog APC 96-115 dB
- IEDs 200-300dB



Where and When Might Exposure Occur?

■ During PDT.

- Practicing firing and manoeuvring (HP lost and not replaced or just not worn).
- Providing simulated resistance to house clearance drills.

■ On Combat Operations:

- Enemy contact
- IED detonation
- Transport to the patrol area by helicopter or ground vehicle.

Hearing protection and surveillance.



Why no earplugs?

- On PDT.
 - Inexperience (undeveloped communication/equipment skills)
 - Urban myth (blank rounds are quieter).
 - Cultural norms.
 - A more resilient population than the average.
 - Peer influence (the resilient leading).
 - Availability of a choice of earplugs.

Why no earplugs?

- On Combat Operations:
 - Need for situational awareness to survive enemy contact. Loss of directional information
 - Unfamiliarity and lack of training with new HP.
 - Compatibility of HP with comms/ the environment/ length of patrol.

Data on Military Hearing Loss

- A few small studies regarding hearing loss in other country forces.
- No studies of prevalence of hearing loss in the RAF Regiment.
- ONS data:
 - Since 2000 only 5 Regt Gunners medically retired for NIHL.
 - 39 retired from the Army and 8 from the RN in a similar time period. (Hansard Jan 2010).
 - Corroborated from RAFMB database.

Referrals to OM for NIHL

- Regiment Gunners make up 6-7% of Service personnel
- 25% of referrals to ROMDs are for advice on NIHL.
- 69% of those referrals are Regiment Gunners.

The Population Sample.

- The audit ran from the 14th September 2008 to the 23rd of July 2010.
- The Power Study. 120 required to demonstrate a difference of 10 dB to give the study a power of 0.8.
- Ideally quota sampling of the total population of Gunners, based on rank and specialist Q.
- Criteria: Member of a Regt Fld Sqn and to have deployed at least once on combat ops.

Participants.

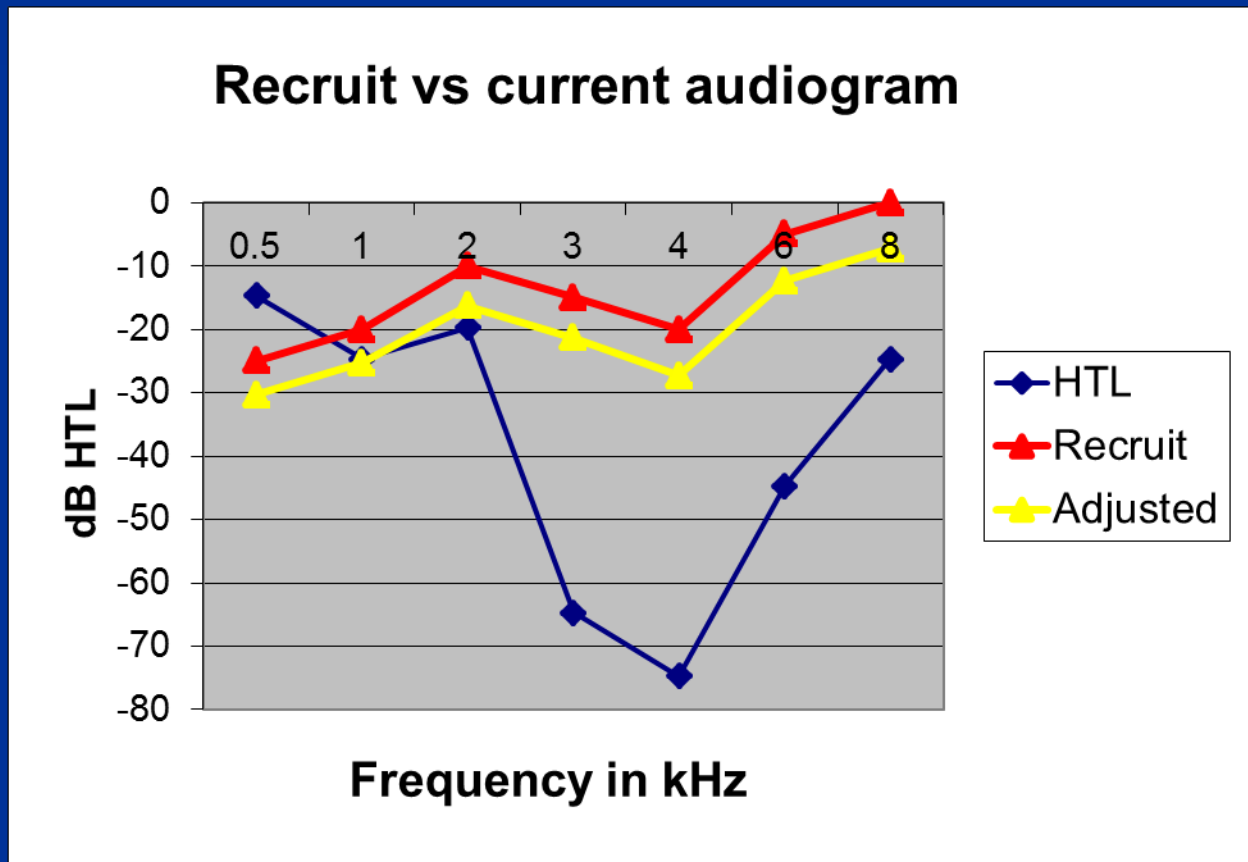
- 51 Field Sqn returned from Iraq Mar 09.
- 15 Field Sqn returned from Afghanistan Jun 09.
- 27 Field Sqn returned from Afghanistan Feb 10.
- 135 Regiment Gunners interviewed.
 - 12 were excluded (URTI, wax, recent noise exposure).
 - None refused to participate.
- Total 123 Gunners included.

Audit method.

- Audiogram performed where none available since last significant noise exposure.
- The completion of a questionnaire and interview: Patterns of noise exposure, use of hearing protection, potential confounding factors.
- Review if the RAF Medical Board records for outcome of those seen for hearing loss.
- Analysis of results and comparison of the findings against an expected performance standard.
- Closing the audit loop

Determining Hearing Loss.

- Adjustment for AAHL to recruitment audiogram to generate expected values using ISO 7029 algorithm



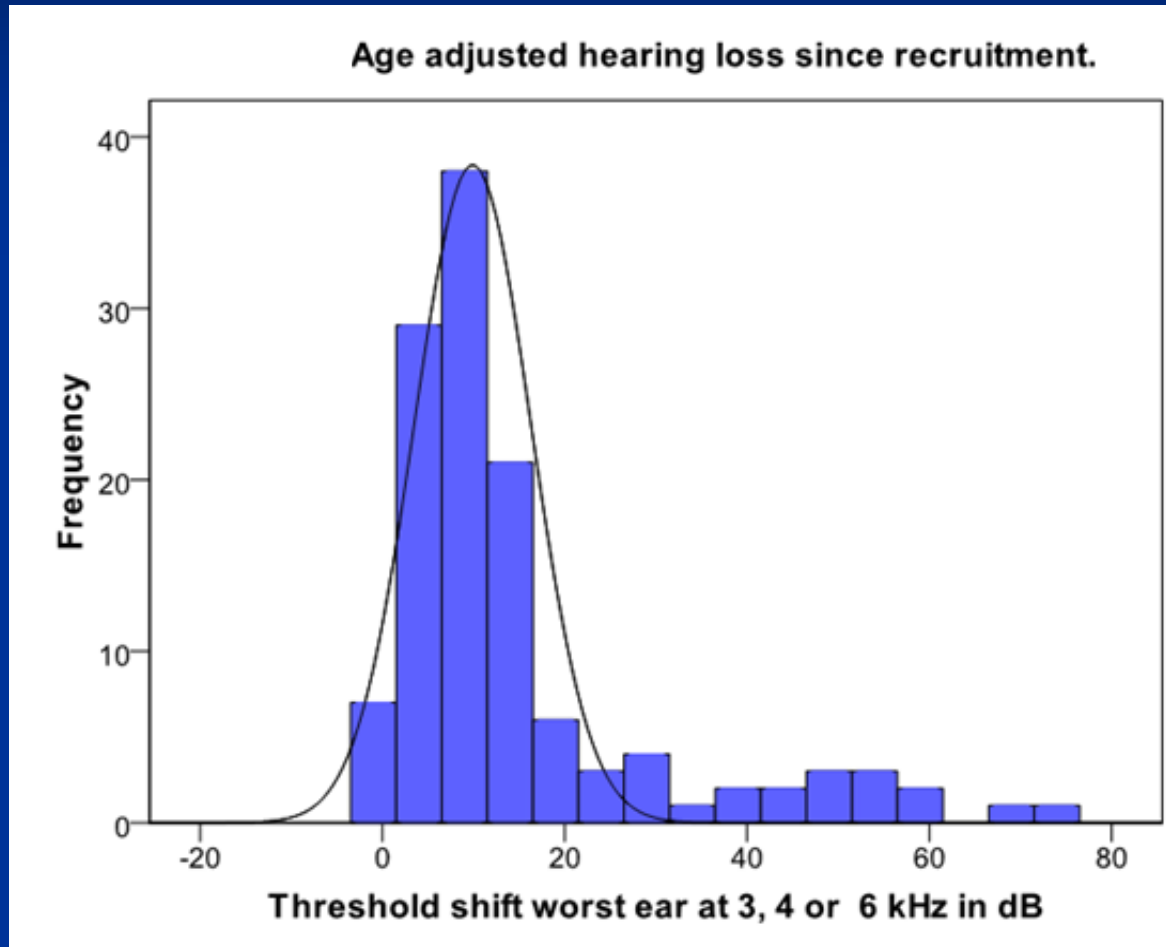
Defining Noise-induced Hearing Loss

- “When any single measurement of hearing threshold level (HTL) at 3, 4 or 6 kHz is at least 10 dB greater than the HTL at 1 kHz or 2kHz” (Coles 2000).
- Accompanied a history of sufficient noise exposure (MRC 1986), accompanied by typical notch/bulge on the audiogram.

Testing for the effect of confounding factors.

- Blood group, eye colour, smoking, handedness, exposure to non-occupational noise, family history of deafness and childhood ear infection were tested for influence on hearing loss. None was shown to contribute significantly.

The Additional Hearing Loss Sustained



Median of threshold shift of 10 dB, IQR 5 to 15 dB, range of 0 to 75 dB.

Testing for a difference in hearing after combat operations.

- Observed hearing acuity derived from the summed thresholds for 1 to 6kHz was significant worse than the expected acuity derived from the recruitment audiograms correct for age ($p < 0.01$ for both ears).

Degree of Hearing Loss

- 88 Gunners (72%) had a threshold shift of at least 10 dB (mild) at 3, 4 or 6 kHz in the worst ear.
- 19 Gunners (15%) had at least 25 dB shift at 3, 4 or 6 kHz.
- 8 Gunners (7%) had at least 50 dB shift at 3, 4 or 6 kHz (2 of ≥ 70 dB).

Where Noise Exposure Occurred

- Of the 123 tested:
 - 13 reported exposure only on PDT.
 - 47 only on deployment
 - 41 on both PDT and deployment
 - 22 recalled no significant unprotected exposure
- 44% of Gunners reported significant unprotected exposure on pre-deployment training.

Time in Service and Hearing Loss

- Median time in service was 3 years.
- There was no difference in degree of hearing loss if those in ≤ 3 years compared with those > 3 years
- ? Healthy worker effect
- ? More effective use of HP with time
- ? Promotion away from noise sources.
- ? Type II error.

Auditing the frequency of hearing surveillance.

- 44 out of the 123 (36%) had not had an audiogram within the last 24 months (median 23 month, inter-quartile range 12 to 28 months, range 1 to 91 months).

Discussion

- Bias: Recall and type II when analysing the contribution of confounding factors and time in service.
- Use of HP by the Rifle Flights and the influence of individual susceptibility within a Rifle Flight
- The importance of involving the end user in the introduction of new hearing protection systems.
- The significance of error in performing and recording audiometric data on Station Medical Centres.

Conclusions and recommendations:

- Pre-deployment training could be a source of potentially avoidable unprotected noise exposure. Changing habits need to be supported by change in culture.
- For hearing surveillance to be performed in a timely and effective manner by Station Medical Centres there needs to be provision of a sufficient number of properly trained personnel to do so.

Summary

- Regiment Gunners are sustaining noise induced hearing loss as a result of combat operations.
- Potentially avoidable hearing loss may be occurring on pre-deployment training.
- The quality of equipment is improving (specifically integrated comms systems).

Mastiff IED strike.

Op Herrick May 2010



Any Questions?

