Allocation followed organisational matching rather than random assignment. The healthy group provided reference measurements but was not a third treatment arm. Its absence of recent clinical episodes must not be interpreted as the effect

The clinical cohort was selected because of acute disease. Its episode and duty-loss values are consequently different in meaning from those of the healthy group. Including the latter as a treatment comparator would confound baseline health status with subsequent management.

The nearly identical baseline means do not establish complete equivalence. Unmeasured differences in barracks exposure, adherence, previous illness or access to review could remain despite the organisational matching.

Recorded clinical episodes

Figure 1. Mean number of recorded ENT episodes in the source three-month windows.

Error bars represent SD. The follow-up between-group p value was 0.003. These are episode counts per participant, not proportions of participants with an event.

Episode counts declined in both groups, but the mean follow-up count was lower under the structured programme. This is the clearest clinical result of the comparison. It is not possible to reconstruct the number of participants with zero, one or multiple episodes from the available means and standard deviations.

The graph joins the two recorded summaries only. It does not imply regular observations between them, and the reduction cannot be converted into an annual prevention effect. Seasonal exposure and the date of programme entry may influence the number of episodes observed over a short interval.

Inflammatory and mucosal outcomes

Table 2. Measurements after three months

Measure	Programme	Routine care	p
CRP, mg/L	6.94 ± 3.29	7.95 ± 3.39	0.076
sIgA, mg/L	108.45 ± 7.05	103.73 ± 7.30	<0.001
Lysozyme, ug/mL	11.92 ± 1.44	11.15 ± 1.40	0.006
Mucociliary clearance, min	17.26 ± 1.81	18.62 ± 1.73	<0.001

Values are mean ± SD; n = 64 and n = 59. p values compare the groups at follow-up. CRP did not meet the 0.05 significance threshold.

sIgA and lysozyme were higher at follow-up in the programme group, while mucociliary clearance time was shorter. These changes were directionally consistent with recovery of local mucosal function. They do not establish that a particular marker mediated the reduction in recorded illness.

CRP decreased within both groups. The final between-group comparison, however, was not statistically significant. The result should not be summarised as a proven superior systemic anti-inflammatory effect of the programme.

The follow-up sIgA mean in the programme group was close to the baseline healthy reference mean. Similar means at two different assessments do not demonstrate restoration of an individual participant to a normal state, and no formal equivalence analysis was reported.

Biomarker interpretation also depends on collection conditions and assay reproducibility. The aggregate summaries do not allow assessment of within-person biological variation, laboratory batch effects or whether the clinical episode preceded the specimen collection.

Mucociliary clearance

Figure 2. Mucociliary clearance time before and after the observation period.

Error bars represent SD. Shorter clearance time was reported in both groups; the between-group comparison at three months was p < 0.001.

The programme group had a lower final mean clearance time than the routine-care group. Nevertheless, its mean remained above the healthy reference value of 14.98 minutes recorded at baseline. It is therefore more accurate to describe an improvement in the measured function than complete normalisation.

The clearance endpoint complements the clinical episode count but cannot replace it. A functional test may improve without a corresponding reduction in severe illness, antibiotic exposure or service disruption. Those outcomes require their own definitions and denominators; they cannot be inferred from the clearance result.

Clinical burden and local monitoring index

Table 3. Clinical and composite outcomes at three months

Measure	Programme	Routine care	p
ENT episodes, mean ± SD	0.80 ± 0.62	1.19 ± 0.78	0.003
Duty days lost, mean ± SD	2.47 ± 2.11	3.08 ± 2.05	0.111
K-ENT index, mean ± SD	31.64 ± 5.79	37.36 ± 8.12	<0.001

Baseline K-ENT values were 46.68 ± 7.21 and 46.33 ± 7.31. The index is local and composite; it is not independent proof of reduced clinical risk.

Figure 3. Secretory IgA at the two recorded assessments.

Error bars represent SD. The vertical scale begins at 70 mg/L to display the observed range; $p < 0.001$ between groups at follow-up.

Discussion

The structured programme was associated with fewer recorded ENT episodes over three months and with more favourable local mucosal measurements. The result is narrower than a claim that the programme reduced every clinical consequence of disease. In particular, the final comparison of duty days lost was not statistically significant.

Military hygiene studies support the feasibility of organisational prevention during training [1,2]. Their interventions and outcomes differ from the present bundle, however. Handwashing studies cannot establish that nasal hygiene was the active component here, and reductions observed in one training environment should not be assumed for another.

The civilian pilot of hypertonic saline irrigation and gargling evaluated an intervention after common-cold onset [3]. The present programme used isotonic hygiene and additional environmental measures. Differences in solution, population and timing preclude a direct effect-size comparison. A larger primary-care trial provides further evidence that nasal interventions can be evaluated against clinically defined respiratory outcomes, but it did not reproduce this military programme [4].

The parallel changes in sIgA, lysozyme and clearance time offer a physiological description of recovery. They do not identify a causal chain from a particular environmental change to mucosal recovery and then to fewer episodes. A mediation analysis would require individual measurements, temporal ordering and control of confounding that were not available.

Limitations

Allocation was non-random and intervention delivery was unblinded. Barracks-level exposure, seasonal variation and differential access to clinical review could influence both adherence and episode ascertainment. The source's wider descriptions of episode windows need reconciliation with its explicitly three-month intervention tables.

The healthy group was a reference population rather than an intervention arm. The local K-ENT index partly summarises clinical burden and should not be treated as an independently validated risk outcome. Aggregate data prevented analysis of repeated episodes, clustering by accommodation and missing observations. No claim of sustained benefit beyond three months or isolated efficacy of one programme component is warranted.

Conclusion

The structured programme was associated with fewer acute ENT episodes and improved mucosal measurements after three months. A comparative reduction in duty days lost was not established. Further evaluation should preserve explicit episode windows, account for barracks-level exposure and distinguish the effects of the programme from those of its individual components.

Declarations

Data provenance. The manuscript uses aggregate intervention tables from the supplied dissertation. No annualised incidence, synthetic patient records or new prediction model was constructed.

Ethics and consent. The ethics committee name, the approval number and the approval date and the consent procedure require author confirmation before submission.

Author information, funding and competing interests. The authors' names follow the supplied manuscript and the co-author information supplied for publication. The official English affiliation, corresponding e-mail, author contributions, funding sources and competing interests require confirmation.

References

1. Ryan MAK, Christian RS, Wohlrabe J. Handwashing and respiratory illness among young adults in military training. Am J Prev Med. 2001;21(2):79–83.

2. Kim HS, Ko RE, Ji M, Lee JH, Lee CS, Lee H. The usefulness of hand washing during field training to prevent acute respiratory illness in a military training facility. Medicine (Baltimore). 2018;97(30):e11594.

3. Ramalingam S, Graham C, Dove J, Morrice L, Sheikh A. A pilot, open labelled, randomised controlled trial of hypertonic saline nasal irrigation and gargling for the common cold. Sci Rep. 2019;9:1015.

4. Little P, Vennik J, Rumsby K, et al. Nasal sprays and behavioural interventions compared with usual care for acute respiratory illness in primary care: a randomised, controlled, open-label, parallel-group trial. Lancet Respir Med. 2024;12(8):619–632.