**Abstract title:** **INSPIRE-CF: A RANDOMISED TRIAL EVALUATING THE LONGITUDINAL EFFECTS OF A WEEKLY SUPERVISED EXERCISE PROGRAMME ON CHILDREN WITH CYSTIC FIBROSIS.**

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**Background:** Exercise is a core component of the physiotherapy management of children with cystic fibrosis (CF), but studies involving unsupervised exercise training have failed to show consistent benefits.

**Purpose:** To evaluate the effects of a 24-month, individually prescribed, supervised, weekly exercise intervention on $FEV_1$, Lung Clearance Index (LCI), exercise capacity ($VO_2$Peak and 10m-Modified Shuttle Walk distance) and quality of life (CFQ-R) in children with CF.

**Methods:** Children aged 6-15 years were randomised by minimisation into control or intervention groups. Both groups received specialist CF care; the intervention group also received a weekly supervised exercise programme (aerobic, strength and core-conditioning) for 24-months.

**Results:** Of 71 children enrolled in the study, aged 10±3 years (mean±SD; range 6-15), with a range of lung disease severity ($FEV_1$ z-scores: -1.10±1.23; $FEV_1$ 86.6±15.3%pred), 4 dropped out (1:control; 3:intervention). 67 completed the study (control:33, intervention:34).

Data at baseline and 24-months respectively, for all participants are presented in the format: Control: baseline to 24-months vs Intervention: baseline to 24-months; adjusted mean between group difference (95% CI) with statistical significance (**) or non-significance (NS).

- $FEV_1$ z-scores: -1.32 to -1.55 vs -0.89 to -1.1; diff=0.12 (-0.4,0.6), NS
- $FEV_1$: 83.8 to 81.3%pred vs 89.2 to 86.8%pred; diff=1.4% (-4.9,7.6), NS
- LCI: 9.6 to 10.3 vs 8.6 to 8.9; diff= -0.8 (-1.9,0.3), NS
- $VO_2$Peak: 36.9 to 42.5ml.kg.min$^{-1}$ vs 36.1 to 43.5ml.kg.min$^{-1}$; diff=1.4 (-1.8,4.5), NS
- 10m-MSWT distances: 963m to 1024m vs 916m to 1182m; diff= 225m (148,302), p< 0.001**
- CFQ-R Physical: 89 to 85 vs 84 to 88: diff= 9% (-0.5,18; p=0.06), NS
- CFQ-R Respiratory: 82 to 74 vs 80 to 82: diff=6.5% (-4,17), NS
- CFQ-R Treatment burden: 77 to 71 vs 67 to 76: diff=13% (3,22), p=0.01**
- CFQ-R Overall quality of life: 82 to 78 vs 77 to 80: diff=6% (1,10), p=0.01**

After adjusting for minimisation factors, there were significant and clinically important between group differences in 10m-MSWT and CFQ-R (treatment burden and overall quality of life domains), in favour of the intervention group. $FEV_1$ and LCI scores deteriorated slightly and $VO_2$Peak improved >15% in both groups over 24-months, with no significant between group differences. There was variability in participant attendance and a significant dose related effect of 'number of weeks trained' on change in $FEV_1$ was observed, indicating that for every 52 weeks trained (one training session per week for a year), participants would expect to see an increase in $FEV_1$ z-score by 0.83 (0.03,1.56; p< 0.04**) compared with the control group, which equates to an improvement of >10%.

**Conclusion(s):** INSPIRE-CF has demonstrated that a supervised weekly exercise programme for children with CF can result in significant and clinically important improvements in 10m-MSWT scores and quality of life measures. Further analysis of study data will clarify relationships between exercise, hospital admissions and costs of health care.

**Implications:** Health care provision for children with CF should incorporate personally prescribed and supervised exercise as part of their overall management. Regular exercise routines established in childhood, may facilitate optimal self-management health behaviours into adulthood. Although $FEV_1$, LCI or $VO_2$Peak did not improve, the significant dose related benefit to $FEV_1$ could assist in prescribing minimum threshold exercise levels in future.

**Key-Words:** Exercise; Paediatrics; Cystic Fibrosis

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