

## Cardiopulmonary impact of a multidisciplinary rehabilitation program implementation in children and young adults with complex congenital heart disease

García-Cuenllas Álvarez L., Maldonado Toral M.J., Casado Sánchez M., Oreja Sánchez C., Centeno Garrido M.A., Sánchez Fernández P. L., Maroto Álvaro E., González Abarquero E., Nieto Blasco J., Campo Bujedo F.

Complejo Asistencial Universitario de Salamanca, Salamanca, Spain

### Introduction and objectives

Cardiac rehabilitation programs (CRP) improve functional capacity in post operated complex congenital heart disease (CHD) patients safely.

We implemented a multidisciplinary CRP for children and adults with complex CHD and their families to quantitatively determine its changes in cardiovascular and respiratory function.

### Methods

24 patients (13 male), 7 children (8-14yo) and 17 young adults (15-35yo).

CHD included 8 post operated Tetralogy of Fallot, 1 Fontan stage, 8 TGA (4 arterial switch, 4 atrial switch), 3 PAIVS, 2 truncus arteriosus, 2 DORV.

We designed a customized cardiopulmonary rehabilitation program including respiratory physiotherapy. We performed EKG, echocardiogram, ergospirometry and 6-minute-walk test. ●●

**Results** After a mean of  $21.5 \pm 4$  training sessions, we found statistically significant improvement in forced vital capacity (FVC, +5,6% improvement respect to baseline;  $p < 0,01$ ); maximal inspiratory pressure (MIP, +14,4%;  $p < 0,05$ ); effort time (ET, +12,7%;  $p < 0,01$ ); real metabolic equivalents (METs, +11,3%;  $p < 0,05$ ),  $VO_2$  %predicted (+3,3%;  $p < 0,05$ ),  $VO_2$  at anaerobic threshold (AT, +5,8%;  $p < 0,05$ ) and decreased VE/ $VO_2$  slope ( $p < 0,02$ ). 6-minute-walk test (6MWT) mean distance increased from initial  $541 \pm 94$  meters to final  $642,5 \pm 87$  m (+18,8%;  $p < 0,01$ ).

Echocardiography did not show significant changes.

No adverse effects described.

|         | FVC (%)  |       | MIP (cm H <sub>2</sub> O) |        | Effort time (seg) |      | Direct METs |      | VO <sub>2</sub> (% predicted) |       | VO <sub>2</sub> at AT (ml/kg/min) |      |
|---------|----------|-------|---------------------------|--------|-------------------|------|-------------|------|-------------------------------|-------|-----------------------------------|------|
|         | pre      | post  | pre                       | post   | pre               | post | pre         | post | pre                           | post  | pre                               | post |
| Mean    | 79       | 85,1  | 50,2                      | 56,7   | 598               | 650  | 8           | 8,4  | 67,4±                         | 70,5  | 16,9                              | 18,8 |
| ± SD    | ±15,5    | ±17,4 | ± 20,3                    | ± 26,4 | ±102              | ±119 | ±2          | ±1,7 | 14                            | ±12,5 | ±3,7                              | ±4,4 |
| Median  | 81       | 85,5  | 52,8                      | 62     | 608,5             | 686  | 8           | 8,9  | 69,2                          | 71,5  | 17,1                              | 18,1 |
| %change | +5,6%    |       | +17,4%                    |        | +12,7%            |      | +11,3%      |      | +3,3%                         |       | +5,8%                             |      |
| p       | p < 0,01 |       | p < 0,05                  |        |                   |      | p < 0,05    |      | p < 0,05                      |       | p < 0,05                          |      |

Forced spirometry, ergometry and ergospirometry statistically significant results. SD standard deviation

### Conclusions

Tailored CRP are safe and capable to improve cardiorespiratory function in children and young adults with complex CHD. We suggest the implementation of this programs as a therapeutic tool