



JOURNAL CLUB

SEPTEMBER 2019 | KEY PAPER SUMMARIES

Midlife cardiorespiratory fitness and the long-term risk of chronic obstructive pulmonary disease

Hansen GM, Marott JL, Holtermann A, et al.
Thorax 2019;74:843–48
 doi:10.1136/thoraxjnl-2018-212821

Chronic obstructive pulmonary disease (COPD) is caused by gradual destruction of the airways and alveoli, typically due to the inhalation of harmful gases and particles. Regular physical activity is associated with a reduced risk of COPD, however, due to the progressive nature of COPD, very long follow-up is required when studying the links between physical activity and COPD to minimise bias from reverse causation (i.e. the measured physical fitness parameter is affected by subclinical disease present at the start of follow-up). In addition to short follow-up timescales, previous studies have relied on self-report measures of physical activity, which can be subjective and prone to overreporting.

Hansen and colleagues set out to examine the association between midlife cardiorespiratory fitness (CRF) and long-term risk of COPD and COPD-related mortality.

In this study, employed middle-aged men (n=4730) were recruited in 1970–71 from the Copenhagen Male Study, a large nationwide observational cohort study. CRF was measured at a single timepoint at baseline by measuring VO₂ max during exercise on a bicycle ergometer. Study participants were then classified into three groups based on their scores (low, normal or high – defined as ± 1 SD above or below the age-adjusted mean). Patients who reported pre-existing COPD were excluded. Follow-up took place over 46 years following the baseline assessment of CRF, with endpoints identified through national registers.

Risk of incident COPD was correlated with CRF at baseline, and was 21% lower in participants with normal CRF (hazard ratio [HR] 0.79, 95% confidence interval [CI] 0.63 to 0.99) and 31% lower in participants with high CRF (HR 0.69, 95% CI 0.52 to 0.91), compared to the low CRF group. The risk of death from COPD was also correlated with baseline CRF. Compared with the low CRF group, the estimated risk of death was 35% lower in participants with normal CRF (HR 0.65, 95% CI 0.46 to 0.91) and 62% lower in participants with high CRF (HR 0.38, 95% CI 0.23 to 0.61). Restricted mean survival times (RMST) analysis showed that, compared to the low CRF group, the normal and high CRF groups experienced a delay to incident COPD and death from COPD of 1.3–1.8 years. Crucially, testing for reverse causation had no significant effect on the results.

These study results suggest a long-term protective effect of good midlife CRF on risk of developing COPD and dying from COPD, which could have implications for how middle-aged men can reduce their risk of COPD.

C-reactive protein testing to guide antibiotic prescribing for COPD exacerbations

Butler CC, Gillespie D, White P, et al.
N Engl J Med 2019;381:111–20
 doi:10.1056/NEJMe1803185

Patients may be prescribed antibiotics for acute exacerbations of chronic obstructive pulmonary disease (COPD), however many exacerbations have a non-infective cause. C-reactive protein (CRP) tests detect circulating CRP produced by the body in response to infection, and could be used to guide antimicrobial prescribing. However, no studies have explored the feasibility of using CRP tests to guide antimicrobial prescribing for acute exacerbations of COPD.

In this study, Butler and colleagues investigated whether point-of-care CRP testing can reduce unnecessary use of antibiotics without harming patients who have acute exacerbations of COPD.

In this multicentre, open label, randomised controlled trial, patients from across 86 general medical practices in England and Wales with a diagnosis of COPD were assigned to two groups. One group received usual care guided by CRP testing (CRP-guided group) and the other received usual care alone (usual-care group).

The first primary outcome measure was patient-reported-antibiotic use for an acute exacerbation of COPD within four weeks of randomisation and the second was COPD-related health status, as measured by the Clinical COPD questionnaire at two weeks after randomisation. The Clinical COPD Questionnaire is a 10-item scale with a score ranging from 0 (very good) to 6 (extremely poor). At six months, patients completed a standardised version of the Chronic Respiratory Disease Questionnaire (CRQ-SAS) and the European Quality of Life-5 Dimensions 5-Level questionnaire (EQ-5D-5L).

Of the 653 patients who underwent randomisation, fewer patients in the CRP-guided group reported antibiotic use than in the usual care group. (57.0% vs. 77.4%; adjusted odds ratio [OR], 0.31; 95% confidence interval [CI], 0.20 to 0.47) Scores on the Clinical COPD Questionnaire at two weeks were also 0.19 points (two-sided 90% CI, –0.33 to –0.05) lower in the CRP-guided group. Clinicians reported their antibiotic prescribing decisions in case report forms, with data ascertained for all but one patient regarding prescribing at the initial consultation, and 96.9% of patients for prescriptions over the first four weeks post-randomisation. Fewer patients in the CRP-guided group than the usual-care group received an antibiotic prescription at the initial consultation (47.7% vs. 69.7%; OR 0.31; 95% CI, 0.21 to 0.45) and during the first four weeks of follow-up (59.1% vs. 79.7%; OR 0.30; 95% CI, 0.20 to 0.46). Two patients in the usual-care group died during the four week study period from causes considered to be unrelated to the trial. At six month follow-up, there were no significant differences between the two groups on CRQ-SAS or quality of life scores.

CRP-guided prescribing of antibiotics for exacerbations of COPD resulted in a lower proportion of patients receiving antibiotic prescriptions from clinicians or reporting use of antibiotics, with no evidence of worsened health or quality

of life outcomes. If implemented in practice, point of care CRP testing could optimise patient care and reduce the unnecessary prescription of antibiotics.

COPD overdiagnosis in primary care: a UK observational study of consistency of airflow obstruction

Josephs L, Cullifor D, Johnson M, et al.
npj Prim Care Respir Med 2019;29:2–19
 doi:10.1038/s41533-019-0145-7

Persistent airflow obstruction (AFO) is fundamental to the diagnosis of chronic obstructive pulmonary disease (COPD). While many patients go undiagnosed, overdiagnosis of the condition is also likely to be a problem.

In this retrospective observational study, patient anonymised individual data from the Care and Health Information Analytics (CHIA) database were analysed. Additionally, the authors assessed the consistency of AFO from initial diagnosis, as well as the factors associated with absent or inconsistent AFO.

A COPD cohort was identified in primary care records and categorised into three groups according to the ratio of forced expiratory volume in 1s to forced vital capacity (FEV1/FVC) measurements from their initial COPD diagnosis. If all their measurements were <70%, they were placed in the 'persistent' group, while patients with some or no measurements <70% were categorised as 'variable' or 'absent' respectively. Respiratory prescriptions between 2011 and 2013 were also analysed by multivariable logistic regression to estimate the likelihood of absent or variable AFO and potential predictors.

14,378 patients with a diagnosis of COPD were identified (mean±standard deviation [SD] age 68.8±10.7 years), with a median (interquartile range [IQR]) time since COPD diagnosis of 60 (25,103) months. 12,491 (86.9%) patients had recorded FEV1/FVC, with a median (IQR) of 5 (3,7) measurements per person. 6,550 (52.4%) had persistent AFO, 4,507 (36.1%) variable and 1,434 (11.5%) absent AFO. The results of the multivariable logistic regression analysis found that being female, never smoking, higher body mass index (BMI) or having comorbidities significantly predicted having absent and variable AFO. Patients with absent AFO were prescribed less medication, but 57.3% still received long-acting bronchodilators and 60.1% still received inhaled corticosteroids. This dropped to 50% and 49% respectively when patients with asthma were excluded. 13.1% of patients with COPD had no recorded FEV1/FVC and 11.5% had absent AFO on repeated measurements, but many still received inhaled pharmacotherapy.

The study suggests many patients may be receiving inhaled medications inappropriately and the true cause of their symptoms may have been missed. Patients without AFO require clinical assessment, as their medications are potentially harmful and costly and a correct diagnosis should be established.

Elderly patients with COPD require more health care than elderly heart failure patients do in a hospital-based home care setting

Persson HL, Lyth J, Wiréhn AB, et al.
Int J COPD 2019;14:1569–81
 doi:10.2147/COPD.S207621

Elderly patients with advanced chronic obstructive pulmonary disease (COPD) or chronic heart failure (CHF) are at increased risk of disease-related events and often have exacerbations requiring hospital admission.

In this study, Persson and colleagues investigated whether telemonitoring supported by hospital-based home care (HBHC) would help detect exacerbations of COPD or CHF earlier and reduce rates of hospitalisation. They also assessed the heterogeneity of patients with advanced COPD and CHF in terms of exacerbation frequency and the need for HBHC.

The study cohort included patients aged ≥65 years with ≥2 hospitalisations in the previous year. Participants were instructed to keep a daily health diary using digital pen technology, documenting respiratory symptoms, medications, shortness of breath and weight changes. Incident exacerbations were also recorded and categorised by an experienced physician as either a COPD or CHF exacerbations and treated correspondingly. All HBHC contacts, whether home visits or telephone consultations, were recorded.

94 patients with advanced COPD (n=36) or CHF (n=58) were recruited, of which 53 subjects completed the one year study period (19 COPD and 34 CHF subjects). The primary reason for study non-completion was death, although there was no significant difference in deaths between the COPD and CHF groups. Subjects with COPD had significantly more exacerbations than the subjects with CHF (COPD 3.2±2.7 (0–10); CHF 0.8±0.9 (0–5), p<0.001). Similarly, patients with COPD had significantly more hospitalisations and home care due to the urgent need to treat COPD exacerbations (COPD 94.4±84.4 (3–334); CHF 67.4±38.0 (5–187), p<0.05), compared to CHF. Compared to the 1-year prior inclusion, the intervention of telemonitoring and HBHC significantly reduced rates of hospitalisation.

Subjects with COPD exhibit exacerbations more frequently than patients with CHF, mainly due to disease characteristics. Telehealth supported by HBHC could help reduce the risk that these exacerbations will result in hospitalisation.

Effectiveness of pulmonary rehabilitation in severe asthma: a retrospective data analysis

Zampogna E, Cents R, Negri S, et al.
J Asthma 2019;13:1–7
 doi.org/10.1080/02770903.2019.1646271

Pulmonary rehabilitation (PR) has a strong evidence base in the treatment of chronic obstructive pulmonary disease (COPD). However, a paucity of studies have investigated the efficacy of pulmonary rehabilitation in cases of severe asthma where symptoms remain uncontrolled despite intensive pharmacological therapy. Many patients with

asthma have comorbid bronchiectasis and/or obstructive sleep apnoea (OSAS), which may contribute to poor asthma control.

The aim of this study was to investigate the effectiveness of PR on functional exercise, dyspnoea and muscle fatigue in a large cohort of patients with severe asthma.

317 patients with severe asthma (as defined by the GINA guidelines) who underwent a multidisciplinary three week rehabilitation program were included in this retrospective analysis. Patients were only included if they had adherence of >80% to PR and were able to complete a Six Minute Walking Test (6MWT). PR was comprised of multiple components, including endurance training, educational meetings, chest physiotherapy, breathing exercises and psychological support. Before and after PR, 6MWT distance and Borg scale scores for dyspnoea and muscle fatigue were recorded.

A total of 371 patients were included in the analysis, of which 39 (10.5%) had bronchiectasis, 163 (43.9%) had OSAS and 17 (4.6%) had both. Following PR, 6MWT distance, Borg dyspnoea and muscle fatigue and mean peripheral capillary oxygen saturation (SpO₂) recorded during 6MWT were all significantly improved ($p < 0.0001$ for all outcomes). Median (interquartile range [IQR]) improvement in 6MWT distance was 33 (14–60) m. In patients with severe asthma and comorbid bronchiectasis and/or OSAS, PR significantly improved 6MWT distance ($p < 0.0001$) and SpO₂ ($p < 0.01$).

This study is the first evidence in a large sample that a multimodal PR treatment program is effective at improving exercise capacity and symptoms in patients with severe asthma. Furthermore, these health benefits were maintained in patients with comorbid bronchiectasis and/or OSAS.

Development and validation of the Adolescent Asthma Self-Efficacy Questionnaire (AASEQ)

Holley S, Knibb R, Latter S, et al.

Eur Respir J 2019;54:1801375

DOI: 10.1183/13993003.01375-2018

Self-efficacy is defined as a personal judgement of how well one can execute courses of action required to deal with prospective situations. Individuals who have high self-efficacy are more likely to perform actions that will lead to successful results, whereas those with low self-efficacy are more likely to cease effort early and fail. Good self-efficacy with respect to asthma self-management is associated with better health outcomes. However, there are no well-validated tools to measure asthma self-management self-efficacy in adolescents.

Holley and colleagues set out to develop and validate an Adolescent Asthma Self-Efficacy Questionnaire (AASEQ).

A prototype scale was developed through a review of the literature, interviews with adolescents with asthma and consultations with parents and healthcare professionals. The reliability and validity of the prototype scale was then assessed in another group of adolescents, who completed the prototype, General Self-Efficacy and KidCOPE scales to assess to measure coping mechanisms and proficiency of asthma management alongside self-efficacy. Subjects were retested to assess the longitudinal validity of the prototype scale.

The interview stage with stakeholders ($n=28$) resulted in a 38-item prototype scale covering medication, symptom management, triggers, knowledge, attitudes and beliefs around asthma, supportive relationships, school and healthcare professionals. 243 adolescents completed the 38-item scale. Factors and reliability analysis reduced the prototype scale to 27 items with four sections: symptom management; medication; friends, family and school; and asthma beliefs. The internal validity of the 27-item scale was respectable to excellent (α 's 0.78–0.91). In subjects who completed it twice ($n=63$), results were stable over time (intra-class correlation = 0.82). Better adolescent self-efficacy was associated with better general self-efficacy and indicators of better asthma management.

The AASEQ represents a well-validated tool that could aid future research and practice focussed on asthma self-management in adolescents. Furthermore, the AASEQ could potentially be used as an intermediate outcome measure to assess the impact of behavioural interventions in adolescents.



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The Primary Care Respiratory Academy is sponsored by *Boehringer Ingelheim*, *Chiesi*, *GlaxoSmithKline* and *Orion Pharma*.

