Using titrated oxygen instead of high flow oxygen during an acute exacerbation of chronic obstructive pulmonary disease (COPD) saves lives

Synopsis


Question: In patients with a suspected acute exacerbation of COPD, does titrated oxygen in the pre-hospital setting change mortality, length of hospital stay and blood gas measurements? Design: Cluster randomised controlled trial in which paramedics were allocated to deliver titrated or high flow oxygen. Randomisation sequence was concealed prior to allocation. Setting: Ambulance service and emergency department in Hobart, Australia. Participants: People who were: transported by ambulance to the emergency department, aged ≥ 35 years, breathless, and were thought to have COPD based on their acute symptoms, a patient-stated history of COPD, or a smoking history of > 10 pack-years. Randomisation of 64 paramedics allocated 32 to the titrated oxygen group and 30 to the high flow oxygen group. Over the study duration, 179 and 226 patients were allocated to the titrated and high flow oxygen groups, respectively. Interventions: Patients in both groups received basic support, nebulised bronchodilators, intravenous dexamethasone and, if necessary, intravenous or intramuscular salbutamol. In addition, the intervention group received titrated oxygen via nasal prongs, with the aim of maintaining arterial oxygen saturation, measured via a pulse oximeter (SpO₂) between 88% and 92%. Nebulised therapy was delivered by compressed air. The control group received high flow oxygen (8 to 10 L/min) via a non-rebreather face mask. Nebulised therapy was delivered by compressed oxygen at 6 to 8 L/min. Outcome measures: The primary outcome was pre-and in-hospital mortality. Secondary outcomes were length of hospital stay and blood gas measurements. Results: The primary outcome was captured for all enrolled patients. According to the intention to treat (ITT) analysis, mortality in the intervention and control groups was 4% (n = 7) and 9% (n = 21), respectively. The relative risk was 0.42 (95% CI 0.20 to 0.89). Similar results were demonstrated when only those patients who had a physician-confirmed diagnosis of COPD were included in the analyses (mortality of 2%, n = 2, vs 9%, n = 11, and relative risk of 0.22, 95% CI 0.05 to 0.9]). The ITT analysis did not demonstrate between-group differences in the secondary outcomes. Conclusion: In patients with a suspected acute exacerbation of COPD, using titrated oxygen to maintain SpO₂ between 88% and 92% reduced the risk of mortality by 58%. Physiotherapists working in acute care should strive to ensure that these patients are not treated with high-flow oxygen.

Commentary

There is an increased risk of hypercarbia (Plant et al 2000) associated with the use of high levels of oxygen therapy in patients with COPD. High levels of oxygen are reported to cause increased ventilation perfusion mismatch (Sassoon et al 1987). National (McKenzie et al 2010) and international (O’Driscoll et al 2008) guidelines for the management of COPD recommend the controlled delivery of oxygen following an acute exacerbation of COPD with a target arterial oxygen saturation ranging between 88% and 92% (O’Driscoll et al 2008).

The trial by Austin et al (2010) provides the first Level 1 evidence that the pre-hospital short-term administration (45 minutes) of a high fraction of inspired oxygen during an acute exacerbation of COPD is associated with worse outcomes that include hypercarbia, respiratory acidosis, and increased mortality. Of note, the average partial pressure of arterial oxygen in the titrated oxygen therapy group was 80 mmHg, in both the intention to treat and the protocol groups, which is considered excessive (O’Driscoll et al 2008), but this partial pressure still led to significant improvements in patient outcome. Some authors recommend accepting an arterial saturation above 85% (New 2006) as a means of achieving better outcomes, but this requires appropriate investigation.

Titrated oxygen therapy to achieve arterial saturation of between 88% and 92% should be the goal of therapy by physiotherapists who care for patients during acute exacerbations of COPD. The close monitoring of changes in ventilation (carbon dioxide) in response to the delivery of oxygen therapy is also recommended. Further research is required to investigate the impact of oxygen therapy on respiratory function in patients during an acute exacerbation of COPD.

George Ntoumenopoulos
Guy’s & St Thomas’ NHS Foundation Trust,
London, UK

References

Traditional Chinese Acupuncture was not superior to sham acupuncture for knee osteoarthritis but delivering treatment with high expectations of improvement was superior to delivering treatment with neutral expectations

Synopsis

Question: What are the comparative effects of Traditional Chinese Acupuncture (TCA) and sham acupuncture for patients with knee osteoarthritis (OA) when controlling for the effect of the acupuncturists’ communication styles? Design: A nested 2-stage randomised clinical trial, where patients were randomised to 1 of 3 style groups, waiting list, high expectations, or neutral expectations, and nested within style, TCA, or sham acupuncture. Setting: A hospital general internal medicine department in Texas, USA. Participants: Men and women over 49 years with knee OA according to the American College of Rheumatology criteria. Additional inclusion criteria were pain in the knee in the preceding 2 weeks, ≥3/10 on a visual analogue scale, no prior treatment with acupuncture, stable treatment with nonsteroidal anti-inflammatory drugs, analgesics, or glucosamine. Exclusion criterion was intra-articular injections in the knee in the previous 2 months. Randomisation of 560 participants allocated 238 to the high expectations group, 242 to the neutral expectations group, and 80 to the waiting list group. Interventions: Six acupuncturists licensed in traditional Chinese medicine carried out the intervention. For the communication style intervention, providers conveyed high expectations of improvement, by using positive utterances such as ‘I think this will work for you’, while neutral expectations were conveyed with uncertainty utterances such as ‘It may or may not work for you’. For the acupuncture intervention the procedure and specific points were standardised by a panel consisting of the acupuncturists in each of the 2 arms: TCA points on the basis of clinical practice, and sham points outside the relevant meridians. Outcome measures: The primary outcomes were Joint-Specific Multidimensional Assessment of Pain (J-MAP), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain subscale, and Satisfaction with Knee Procedure (SKIP) measured at 4 weeks, 6 weeks (end of treatment), and 3 months. Results: 527 (94%) participants completed the study. There were no significant differences between the TCA and sham groups in any of the outcome measures. Patients in the high expectations communication style group had statistically significant improvements in pain (J-MAP) and satisfaction (SKIP) compared with the neutral group. Mean differences (95% CI) at 3 months follow up were 0.4 (0.1 to 0.7) for J-MAP (1 to 7 scale), and 0.2 (0.03 to 0.3) for SKIP (1 to 5 scale). Conclusion: In patients with knee OA, needling of meridian points was not more effective than the use of sham points, whereas acupuncturists’ communication styles had a small but statistically significant effect on pain reduction and satisfaction.

Commentary
This trial raises two important research questions. First, is TCA more effective than sham acupuncture and waiting list? Second, does provider communication style have an effect on treatment response? The trial provides strong evidence that TCA is not more effective than sham acupuncture. Both interventions were more effective than waiting list though, and, given that the sham procedure was successful, the effect can be considered as a placebo effect. Further, this trial showed that communication style mattered more than the provided treatment with respect to pain perception and satisfaction.

The authors should be acknowledged for their trial design, which enabled them to control for and measure the effects of provider-patient interactions in the response to acupuncture. The use of penetrating needling as sham procedure instead of a sham procedure with retractable needles strengthens the conclusion of no difference in effect between TCA and sham acupuncture.

The strong monitoring with audio taping of the treatment sessions ensured high compliance among the treatment providers. This might have contributed to the significant but small effect of communication style. It is interesting to observe that the main effect of both treatments appeared within the first follow-up at 4 weeks, indicating that the placebo response appeared early. This finding is of clinical importance as a limited number of treatment sessions were enough to achieve a placebo response.

Should we recommend acupuncture to patients with knee OA? The authors do not give us any help here since they do not address this question. On one hand we can say that we can recommend acupuncture since it is better than waiting list, although the positive benefits are probably due to a placebo effect. Placebo is an important positive mechanism to use as a clinician. A warm and positive consultation style can be recommended irrespective of treatment modality. On the other hand, there are ethical considerations by recommending treatments that have shown to contain mainly a placebo effect. Although this trial was about acupuncture, it may make us think about many of our physiotherapy interventions – to consider whether the positive effects we observe and measure are due to the intervention or more to do with the way we deliver the intervention.

Margreth Grotle
Oslo University Hospital and Diakonhjemmet Hospital,
Oslo, Norway
Expanded cardiac rehabilitation reduces cardiac events over five years

Synopsis


Question: In people with coronary artery disease, does an expanded cardiac rehabilitation program reduce cardiac deaths, myocardial infarctions, and hospital admissions due to cardiovascular disease? Design: Randomised, controlled trial with intention-to-treat analysis. Setting: A University hospital in Sweden. Participants: People aged less than 75 years who had had a recent myocardial infarction or coronary artery bypass grafts were eligible to participate. Severe co-morbidities were exclusion criteria. Randomisation of 224 participants allocated 111 to undergo expanded cardiac rehabilitation and 113 to a control group. Interventions: Both groups received standard cardiac rehabilitation, including physical training, education, group and individual counselling, and support to cease smoking. All participants received appropriate preventive medications. In addition, the intervention group received 20 group sessions of stress management, 3 sessions of cooking and diet counselling by a dietitian, and a 5-day stay at a ‘patient hotel’ with several activities including physical training and information. Outcome measures: Although other outcomes were reported at the conclusion of 1-year follow-up, the outcomes at the 5-year follow-up were rates of cardiac events: cardiovascular death, acute myocardial infarction, and readmission to a hospital due to other cardiovascular causes. Results: All participants were followed up via national registers of health and mortality. During the 5-year follow-up, 53 (48%) participants in the expanded cardiac rehabilitation group and 68 (60%) participants in the control group had a cardiac event (hazard ratio 0.69, 95% CI 0.48 to 0.99). This difference was mainly due to only 12 (11%) participants having non-fatal myocardial infarctions in the treatment group versus 23 (20%) in the control group (hazard ratio 0.47, 95% CI 0.21 to 0.97). The number of hospitalisations and the number of days of hospitalisation were both significantly fewer in the treatment group than in the control group. Conclusion: Expanded cardiac rehabilitation after acute myocardial infarction or coronary artery bypass surgery reduces the long-term rate of cardiovascular events by reducing myocardial infarctions and days in hospital for cardiovascular reasons.

Commentary

Improving access to effective secondary prevention for people with coronary disease remains a focus of international research. Evidence suggests that secondary prevention programs significantly reduce all-cause mortality, recurrent myocardial infarction, and coronary risk factor profiles, and improve quality of life (Clark et al 2005). However, the optimal format, including frequency and duration, for secondary prevention programs is unclear so studies with long-term follow-up are needed.

Investigation of long-term outcomes is particularly important in coronary disease because there is an expectation that patients make life-long behavior changes. However, very few studies have reported long-term outcomes of interventions to promote lifestyle modification after cardiac rehabilitation. Three studies found moderate but significant maintenance of improvements in risk factors and medication adherence at four and five years (Neubeck et al 2010, Lear et al 2006, Cupples and McKnight 1999). Another study reported a reduction in cardiovascular events at four years (Murchie et al 2003).

While the current study is a single-centre study, it includes 224 patients and the authors achieved 100% follow-up for their composite end-point via the available national registries. The intervention itself was multifactorial and an expanded form of traditional cardiac rehabilitation. As the authors point out, it was unfortunate that data about risk factors were not collected at 5-year follow-up. While this information would be of great interest, perhaps the potential for loss to follow-up in such long-term studies remains a major hurdle for researchers.

While this study sheds further light on the topic of long-term outcomes, a key question remains: do the benefits of a time-limited intervention persist over time or do patients require ongoing support via a continuous program? Clearly, this question is of great interest to patients, health care providers, and policy makers in terms of resourcing and optimum program design.

Julie Redfern
The George Institute for Global Health;
The University of Sydney, Sydney

References