Appendix E1. Characteristics of studies included in the evidence synthesis

Study details	Population	Buteyko intervention arm(s)	Comparator arm(s)	Outcomes (* = selected for synthesis)
Arora 2019 [BU-006-S] **Country:** India **Setting (detail):** hospital - outpatient (chest medicine outpatient department) **RCT design:** parallel group	**No. randomised [eligible treatment arms] (age; sex):** 28 adults (B. 49 years, C. 47 years [mean]; B. 36% female, C. 43%) **Treatment goal:** relieve symptoms of a condition (COPD) **Inclusion criteria:** COPD, FEV1/FVC <0.7, FEV1 <79% of predicted (for at least 30% of participants), resting RR 24 or over **Exclusion criteria:** Exacerbation requiring hospital admission (last 4 weeks), myocardial complications, musculoskeletal pain **ICD code:** CA22 Chronic obstructive pulmonary disease	**Name:** Buteyko + conventional chest physiotherapy **What – procedure:** Instruction on breath hold (control pause) and nasal breathing techniques, and practise of repeated cycles of nasal breathing and control pause, with rest periods (30 seconds to 2 minutes) between each cycle. Practise during clinic sessions (initially with instruction, then unclear if supervised) plus self-guided practise following instruction on a 20-minute video. **When & how much:** 2 to 3 sessions of instruction; 3 x 20 minutes practise per week during attendance at physiotherapy clinic; advice to practise (frequency NR) over 4 weeks **Who administered (provider); training:** provider administered, self-administered, provider prescribed (NR); NR **Co-intervention(s):** see comparator arm	**Name:** inactive control - chest physiotherapy co-intervention **What – procedure:** conventional chest physiotherapy involving nebulisation, postural drainage and breathing control exercise (diaphragmatic and pursed lip). **When & how much:** 3 x 15-20 minute sessions per week over 4 weeks **Who administered (provider):** provider administered **No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** none	**Eligible outcomes:** *Physical function (activity limitations):* functional exercise capacity (6 minute walk test, % predicted value)* *Lung function:* PEFR (resting)* *Breathing patterns & ventilation:* respiratory rate (resting) [not selected as outcome not prioritised] **Ineligible outcomes:** **Timing of outcome measurement:** 4 weeks (end of intervention period)*
Arora 2022 [BU-007-S] **Country:** India **Setting (detail):** hospital - outpatient (tertiary health care centre) **RCT design:** parallel group	**No. randomised [eligible treatment arms] (age; sex):** 66 (age and sex of participants not reported) **Treatment goal:** relieve symptoms of a condition (hypertension, primary) **Inclusion criteria:** primary hypertension **Exclusion criteria:** NR **ICD code:** BA00 Essential hypertension	**Name:** Buteyko + usual care **What – procedure:** Instructions on control pause (breath hold) and slow breathing, supervised sessions applying 5 sets of control pause followed by slow breathing (3 minutes), then rest (2 minutes) and another 5 sets (video guided). Advice to practise daily at home. **When & how much:** 1 x 30 minute supervised session per week over 4 weeks (practising as per video); advice to practise daily at home	**Name:** inactive - usual care **What – procedure:** medical management, antihypertensive medications and patient education video about hypertension, medications and lifestyle management (diet, activity, rest, alcohol) **When & how much:** n/a **Who administered (provider):**	**Eligible outcomes:** *Physical function (activity limitations):* functional exercise capacity (6 minute walk test, % predicted value)* *Physiological function, signs & Symptoms:* blood pressure (SBP*, DBP), heart rate (HR) **Ineligible outcomes:** *Process measure:* control pause time **Timing of outcome measurement:** 4 weeks (end of intervention period)*

Study details	Population	Buteyko intervention arm(s)	Comparator arm(s)	Outcomes (* = selected for synthesis)
		Who administered (provider); training: provider administered, self-administered, provider prescribed (NR); NR **Co-intervention(s):** usual care as per comparator arm	n/a **No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** none	
Hassan 2012 [BU-018-S] **Country:** India **Setting (detail):** hospital - outpatient (chest hospital) **RCT design:** parallel group	**No. randomised [eligible treatment arms] (age; sex):** 40 adults (BU. 42 years [mean], C. 40 years; BU. 35% female, C. 55%) **Treatment goal:** relieve symptoms of a condition (asthma, adult) **Inclusion criteria:** Bronchial asthma for ≥ 3 years **Exclusion criteria:** Cardiac disease, intellectual disability **ICD code:** CA23.32 Unspecified asthma, uncomplicated	**Name:** Buteyko + prescribed medications **What – procedure:** Buteyko training sessions on 'control pause' and 'shallow breathing' technique, followed by 4 cycles of a sequence of control pause (2 minutes), reduced breathing (4 minutes), and then 2 minutes rest. **When & how much:** 14 x 20 minute sessions over 6 weeks (4 sessions in week 1, and then 2 per week) **Who administered (provider); training:** (NR); NR **Co-intervention(s):** see comparator arm	**Name:** inactive - usual care (prescribed medications) **What – procedure:** usual medications and care from physician **When & how much:** n/a **Who administered (provider):** n/a **No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** none	**Eligible outcomes:** *Symptoms:* asthma symptom control - overall (ACQ)* *Lung function:* Peak Expiratory Flow Rate (PEFR)* **Ineligible outcomes:** *Process measure:* control pause test **Timing of outcome measurement:** end of week 6 (reported as 'end of intervention')*
Jain 2023 [BU-021-S] **Country:** Indian **Setting (detail):** hospital - inpatient, hospital - outpatient (cardiovascular/thoracic surgery unit) **RCT design:** parallel group	**No. randomised [eligible treatment arms] (age; sex):** 44 (B. 61 years, C. 60 [mean]; B. 45% female, C. 41%) **Treatment goal:** relieve surgery-related side effects (CABG, depression/anxiety) **Inclusion criteria:** post CABG, signs of anxiety (GAD-7 score >8) and depression (PHQ-9 score >10), BMI <30 Kg/m2 **Exclusion criteria:** preoperative haemodynamic complications (e.g. myocardial infarction last 2 weeks, lung congestion), postoperative mechanical ventilation >24 hours, history of heart	**Name:** Buteyko + cardiac rehabilitation **What – procedure:** Instruction on control pause (breath hold) and shallow breathing, followed by 3-4 supervised cycles of control pause and then shallow breathing per session. **When & how much:** 2 x 20 minutes of BBT per day over 2 weeks (until or after discharge) **Who administered (provider); training:** provider administered, self-administered, provider prescribed (NR); NR **Co-intervention(s):** see comparator arm	**Name:** inactive - cardiac Rehabilitation program **What – procedure:** cardiac rehabilitation as per American Association of Cardiovascular and Pulmonary Rehab (AACVPR) guidelines. **When & how much:** 2 x 25-40 minutes sessions per day over 2 weeks **Who administered (provider):** provider administered	**Eligible outcomes:** Emotional functioning/ mental health: mental distress - anxiety (GAD-7)*; mental distress - depression (PHQ); self-efficacy (General Self-Efficiency Scale (GSS)) *Physical function (activity limitations):* functional exercise capacity (Borg Rate of Perceived Exertion Scale (RPE))* **Ineligible outcomes:** *Process measure:* Breath Holding Test (BHT) **Timing of outcome measurement:** week 2 (end of intervention period)*

Study details	Population	Buteyko intervention arm(s)	Comparator arm(s)	Outcomes (* = selected for synthesis)
	failure, ejection fraction < 20%, chronic smoker **ICD code:** BA8Z Diseases of coronary artery, unspecified		**No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** none	
Mohamed 2019 [BU-028-S] **Country:** Egypt **Setting (detail):** hospital - inpatient (chest ward or outpatient clinic) **RCT design:** parallel group	**No. randomised [eligible treatment arms] (age; sex):** 100 adults (B. 49 years; C. [mean]; B. 26% female, C. 27%) **Treatment goal:** relieve symptoms of a condition (asthma, adult) **Inclusion criteria:** Bronchial asthma requiring regular treatment (including medication, inhalers) **Exclusion criteria:** Mental illness, acute health problems (e.g. cardio-pulmonary), co-morbidities, seriously ill **ICD code:** CA23.32 Unspecified asthma, uncomplicated	**Name:** Buteyko + prescribed medications **What – procedure:** Buteyko technique training program with instruction on 'control pause' and 'shallow breathing' technique, 4 cycles of control pause, reduced breathing (4 minutes), and then 2 minutes rest. Advice to practise at home morning and evening at least two hours after eating. **When & how much:** 4 x 30-minute theory sessions and 6 x 50-minute practical sessions (timeframe NR); advice to practise 2 x per day at home over 1 month **Who administered (provider); training:** provider administered, self-administered, provider prescribed (NR); NR **Co-intervention(s):** usual care as per comparator arm	**Name:** inactive - usual care **What – procedure:** routine hospital care (inpatient or outpatient), usual medical treatment **When & how much:** **Who administered (provider):** n/a **No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** none	**Eligible outcomes:** *Symptoms:* asthma symptom control - overall (GINA assessment of asthma control)*; asthma symptom severity (NAEPP patient self-assessment of asthma symptom severity - proportion reporting each response option for day time symptoms, nights with symptoms, short acting beta-agonist use, interference with normal activities) *Physical function (activity limitations):* interference with normal activities (NEAPP patient self-assessment of asthma symptom severity item)* **Ineligible outcomes:** n/a **Timing of outcome measurement:** 1 month* (end of intervention period; including period of self-administration)
Mohamed 2022 [BU-029-S] **Country:** Egypt **Setting (detail):** hospital - outpatient (chest ward or outpatient clinica) **RCT design:** parallel group	**No. randomised [eligible treatment arms] (age; sex):** 90 children (BU. 8.6 years, C. 8.2 [mean]; BU. 50% female, 47%) **Treatment goal:** relieve symptoms of a condition (asthma, child) **Inclusion criteria:** Bronchial asthma requiring regular treatment (including medication, inhalers) **Exclusion criteria:** Mental illness, acute health problems (e.g. cardio-pulmonary), co-morbidities, seriously ill	**Name:** Buteyko **What – procedure:** Buteyko technique training program with instruction on 'control pause' and 'shallow breathing' technique, followed by 2 cycles of reduced breathing (4 minutes), 2 minutes rest, and then control pause (2 minutes). Advice to practise at home before eating or at least two hours after. **When & how much:** 60 minute sessions per day over 3 to 5 days; advice to	**Name:** inactive - usual care **What – procedure:** routine hospital care (inpatient or outpatient), usual medical treatment **When & how much:** n/a **Who administered (provider):** n/a	**Eligible outcomes:** Global *Symptoms:* asthma symptom control - overall (GINA assessment of asthma control)*; asthma symptom severity (NAEPP patient self-assessment of asthma symptom severity - proportion reporting each response option for day time symptoms, nights with symptoms, short acting beta-agonist use, interference with normal activities) *Physical function (activity limitations):* interference with normal activities (NEAPP patient self-assessment of asthma symptom severity item)* **Ineligible outcomes:** n/a

Study details	Population	Buteyko intervention arm(s)	Comparator arm(s)	Outcomes (* = selected for synthesis)
	ICD code: CA23.32 Unspecified asthma, uncomplicated	practise 2 x 15 minutes per day at home over 3 months **Who administered (provider); training:** provider administered, self-administered, provider prescribed (NR); NR **Co-intervention(s):** usual care as per comparator arm	**No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** Pranayama Breathing Technique (PBT)	**Timing of outcome measurement:** 3 months (approx. 11 weeks after initial training, and end of self-administered intervention period)*
Opat 2000 [BU-031-S] **Country:** Australia **Setting (detail):** community based (at home) **RCT design:** parallel group	**No. randomised [eligible treatment arms] (age; sex):** 36 (B. 32 years, C. 33 [mean]; B. 50% female, C. 67%) **Treatment goal:** relieve symptoms of a condition (asthma, adult) **Inclusion criteria:** asthma (previously diagnosed by medical practioner); 3 or more doses of inhaled bronchodilator per week **Exclusion criteria:** taking oral corticosteroids; taking >1600pg of inhaled steroid per day; severe asthma exacerbation within 6 weeks of trial commencement **ICD code:** CA23.32 Unspecified asthma, uncomplicated	**Name:** Buteyko + prescribed medications **What – procedure:** Video on buteyko theory with self-guided practical (67 minutes total); daily practise involving short periods of shallow-breathing (reduced breathing) followed by breath holding (control pause) while watching the self-guided portion of the video. **When & how much:** 2 x 20 minutes self-guided session per day over 4 weeks **Who administered (provider); training:** self-administered, provider prescribed (video - therapist unspecified); NR **Co-intervention(s):** usual care as per comparator arm	**Name:** inactive - sham **What – procedure:** Video with images and sounds of nature/classical music, without breathing instruction (60 minutes total); daily viewing of portion of this video of own choosing. Usual prescribed medication, no change to diet, no mouth taping while sleeping **When & how much:** 2 x 20 minutes per day over 4 weeks **Who administered (provider):** self-administered, provider prescribed **No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** none	**Eligible outcomes:** *Symptoms:* asthma symptoms (symptom diary: daytime symptoms, nighttime symptoms, asthma medication intake, peak flow readings); medication use (symptom diary: asthma medication intake - reliever used (short acting beta-agonist)*, controller use (inhaled corticosteroids) [daytime symptoms preferred but results incompletely reported] *Emotional functioning & mental health:* emotional wellbeing (AQLQ, Marks et al - mood disturbance subscale*) *HR-QoL:* overall HR-QoL (AQLQ, Marks et al - total score*; breathlessness, mood disturbance, social disruption, concern for health subscales) *Lung function:* peak expiratory flow* [results incompletely reported] **Ineligible outcomes:** n/a **Timing of outcome measurement:** daily over 4 weeks (symptom diary), week 4 (HRQoL)
Prem 2013 [BU-033-S] **Country:** India **Setting (detail):** hospital - outpatient (chest medicine)	**No. randomised [eligible treatment arms] (age; sex):** 80 adults (B. 38 years, C. 41 [mean]; B. 59% female, C. 65%) **Treatment goal:** relieve symptoms of a condition (asthma, adult)	**Name:** Buteyko **What – procedure:** Training in technique of breath holding (control pause) interspersed with periods of shallow breathing, and accompanied by physical activity. Instruction to practise method daily.	**Name:** inactive - usual care **What – procedure:** routine physician care involving pharmacological management **When & how much:** n/a	**Eligible outcomes:** *Symptoms:* Asthma symptom control - overall (ACQ)* *Emotional functioning & mental health:* emotional status (AQLQ; Juniper et al - emotion subscale*)

Study details	Population	Buteyko intervention arm(s)	Comparator arm(s)	Outcomes (* = selected for synthesis)
RCT design: parallel group	**Inclusion criteria:** asthma, AQoL score < 5.5, FEV1 increase by 12% following bronchodilator administration, bronchodilator for six months or more **Exclusion criteria:** exacerbation in 8 weeks prior to trial, medical conditions impairing use of breathing techniques, pregnancy, **ICD code:** CA23.32 Unspecified asthma, uncomplicated	**When & how much:** 1 x 60 minute training session per day for 3-5 days; advice to practise 2 x 15 minutes per day over 3 months. **Who administered (provider); training:** provider administered, self-administered, provider prescribed (NR); NR **Co-intervention(s):** NR	**Who administered (provider):** n/a **No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** none	*HR-QoL:* overall HR-QoL (AQLQ; Juniper et al - overall*; symptoms, activities, emotion, environment subscales) *Physical function (activity limitations):* activity limitations (AQLQ; Juniper et al - activities subscale*) *Lung function:* FEV1*; FEV1/FVC **Ineligible outcomes:** n/a **Timing of outcome measurement:** 3 months (end of intervention period)*
Sathe 2020.1 [BU-035-S] **Country:** India **Setting (detail):** other (physiotherapy college) **RCT design:** parallel group	**No. randomised [eligible treatment arms] (age; sex):** 42 adults (B. 61 years, C. 61 [mean]; B. 41% female, C. 45) **Treatment goal:** relieve symptoms of a condition (hypertension, CABG history) **Inclusion criteria:** Hypertension, history of CABG or angioplasty (last 20 years), on hypertensive medication (also noted: addictions, diabetes, thyroid disease, mild physical activity) **Exclusion criteria:** Unstable or acute respiratory disease, cognitive problems, undergoing cardiac or respiratory rehabilitation **ICD code:** BA00 Essential hypertension	**Name:** Buteyko **What – procedure:** Instruction on control pause (breath hold) and shallow breathing techniques, followed by approximately 6 cycles of control pause and then shallow breathing. **When & how much:** 1 x session, length of session not reported (study of 1 month duration, but outcomes were measured immediately after session and there is nothing to suggest >1 session) **Who administered (provider); training:** provider administered, self-administered, provider prescribed (NR); NR **Co-intervention(s):** n/a	**Name:** inactive - no intervention **What – procedure:** n/a **When & how much:** **Who administered (provider):** n/a **No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** none	**Eligible outcomes:** *Physiological function, signs & Symptoms:* blood pressure (systolic (SBP)*, diastolic (DBP)), oxygen saturation **Ineligible outcomes:** *Physiological function, signs & Symptoms:* heart rate **Timing of outcome measurement:** day 1 (immediately after single intervention)
Vagedes 2021 [BU-042-S] **Country:** Germany **Setting (detail):** hospital - outpatient (NR)	**No. randomised [eligible treatment arms] (age; sex):** 32 (B. 10.4 years, C. 10.7 [mean]; B. 37% female, C. 31%) **Treatment goal:** relieve symptoms of a condition (asthma, child) **Inclusion criteria:** asthma (physician-diagnosed partly controlled)	**Name:** Buteyko **What – procedure:** Training of children in use of specific exercises including breath holding and deliberate hypoventilation exercises. Began with control pause and succession of reduced breathing, extended and maximum pauses (also practised during	**Name:** inactive - usual care **What – procedure:** standard medication prescribed by physicians **When & how much:** n/a	**Eligible outcomes:** *Symptoms:* asthma symptom control - overall (ACQ)*; medication use (bronchodilator use (beta-2 agonists); corticosteroid (ICS) use) *Lung function:* FEV1 (at rest*, after ergometer exercise, after bronchospasmolysis) **Ineligible outcomes:** *Breathing patterns & ventilation:* SO2 [considered ineligible given

Study details	Population	Buteyko intervention arm(s)	Comparator arm(s)	Outcomes (* = selected for synthesis)
RCT design: parallel group	**Exclusion criteria:** n/a **ICD code:** CA23.32 Unspecified asthma, uncomplicated	activities). Parents trained to ensure correct supervision and booster to provide corrective instructions. Instruction to practise daily at home. **When & how much:** 5 x 90 minute training sessions over 5 days, then 1 x booster session in the following week; instruction to practise 2 x 15 minutes per day over 3 months **Who administered (provider); training:** provider administered, self-administered, provider prescribed (Alexander Technique teacher); other training **Co-intervention(s):** usual care as per comparator arm	**Who administered (provider):** n/a **No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** none	long-term treatment, not exacerbations]; *Process measure:* breath hold test; Parents' *HR-QoL:* overall HR-QoL (PAQLQ-S - activity limitations, emotional function subscales) **Timing of outcome measurement:** 3 months (end of intervention period)*
Zeng 2019 [BU-046-S] **Country:** China **Setting (detail):** hospital - outpatient (NR) **RCT design:** parallel group	**No. randomised [eligible treatment arms] (age; sex):** 56 adults (B. 39 years, C. 41 [mean]; B. 41% female, C. 46%) **Treatment goal:** relieve symptoms of a condition (eustachian tube dysfunction) **Inclusion criteria:** Obstructive eustachian tube dysfunction (ETDQ-7 score 2.1 or above, type A or type C tympanogram after exclusion of patulous ETD); persistent symptoms (>3 months), no medications **Exclusion criteria:** Chronic suppurative otitis media, history of OME, chronic rhinosinusitis, history of radiation, fluctuating sensorineural hearing loss, acute upper respiratory infection, temporomandibular joint disorder **ICD code:** AB10 Disorders of Eustachian tube	**Name:** Buteyko + nasal steroids **What – procedure:** Instruction on Buteyko breathing technique to reduce depth and frequency of breathing (details NR). Advice to practise the Buteyko exercises repeatedly throughout the day. **When & how much:** participants were advised to practise daily; duration NR but assumed to be over 12 week period (last follow-up); number/length of instruction sessions NR **Who administered (provider); training:** provider administered, self-administered, provider prescribed (Alexander Technique teacher); NR **Co-intervention(s):** see comparator arm	**Name:** inactive control - nasal steroids **What – procedure:** nasal steroid regimen (budesonide) **When & how much:** 2 x sprays per nostril once per day (256 µg total daily dose) **Who administered (provider):** self-administered, provider prescribed **No. arms included in synthesis (treatment & control):** 2 **Ineligible arms:** none	**Eligible outcomes:** *Symptoms:* global symptoms (Eustachian Tube Dysfunction Questionnaire (ETDQ-7) symptom score*; proportion reporting symptom relief (ETDQ-7 score <2.1)) **Ineligible outcomes:** Middle ear function tests: tympanogram, positive Valsalva manoeuvre **Timing of outcome measurement:** weeks 6 and 12* (have assumed ongoing use of self-administered intervention, hence week 12 considered to be end of intervention period)