SUPPLEMENTARY MATERIAL 1.

Appendix A: Study protocol

Part A: Recruitment of subjects

- All consecutively admitted patients in 2017 and 2020 April to October as control and intervention group respectively
- Excludes patients who had received intensive care in another institution prior to our centre
- Daily screening of patients within 24 hours of ICU admission

Part B: General protocol for mobilisation

Physiotherapy methodology

The initial evaluation of admitted patients is performed by a physiotherapist within 24 hours with training in critical care physiotherapy. Absolute exclusion criteria are listed in Part D of this appendix, who will receive conventional care. For those who are not receiving conventional care, patients are reassessed daily with daily reduction or cessation of sedation as appropriate with titration against the Richmond Agitation Sedation Scale (RASS) or 0 to -2 for mechanically ventilated patients. Early mobilisation can be performed by a physiotherapist and/or trained nursing staff in mobilisation as appropriate with oversight from a senior physiotherapist. For those who are unable to follow command or unconscious, passive mobilisation is defined as minimum of 30 minutes daily (may be assisted with Theraband, The Hygenic Corporation, Malaysia; Motomed LETTO2, Reck, Germany). Otherwise, patients receive mobilisation on the bed as defined below in 'Definition of active mobilisation in bed' (may be assisted with Theraband, The Hygenic Corporation, Malaysia; Motomed LETTO2, Reck, Germany; Minipress 4100, Shuttle, USA). Mobilisation out-of-bed, such as transfer training, sitting out of bed with assistance and assisted cycling or upper limb exercises in supported sitting, is initiated once no exclusion criteria is met for such mobilisation as set in Part E of this appendix (may be assisted with Sara Combinizer, ArjoHuntleigh, Sweden; Motomed LETTO2, Reck, Germany; Minipress 4100, Shuttle, USA; Static bicycle ES-110, Golden Horse Company, China). Subsequently, patients progress stepwise to dangling and sitting at edge-of-bed when limb power reaches at least grade 3 in the Medical Research Council Muscle Scale (MRC). Patients not reaching this continue passive or assisted active mobilisation out-of-bed. Those who are successful progress to standing exercises with or without aid, with a gradual reduction in assistance with standing and marching, and finally an attempt on walking as defined in below (may be assisted with Arjo Walker, ArjoHuntleigh, Sweden; Walking frame 4172, Golden Horse Company, China; Rollator 4081, Golden Horse Company, China) . A predefined criteria is listed in Part F where mobilisation exercises for the day will cease.

Definition of passive mobilisation

Any mobilisation which do not require the physical effort of the patient

Definition of active mobilisation in bed

Mobilisation on the bed requiring the physical effort (of any degree) of the patient. Body position during exercise must be at sitting up at minimum 30 degree elevation of back rest except bridging and cycling in bed. Exercise can include the following:

i) Limb exercises

- Upper limb: progressive graded shoulder elevation, elbow extension, wrist extension and finger exercise
- Lower limb: progressive graded hip and knee flexion and extension, ankle dorsiflexion and plantarflexion, straight leg raising and quadriceps exercise
- Active range of movement/ strengthening exercise
- Active assisted
- Free active
- Resisted exercise
- Bridging
- Cycling on bed
- Transfer training/turning

ii) Breathing exercise
- Respiratory muscle training
- Diaphragmatic breathing exercise, inspiratory and expiratory muscle training

Definition of out of bed mobilisation
1. Transfer training: eg. lying to sitting
2. Sitting at bedside (dangling)
3. Sitting out of bed with assistance
4. Assisted cycling exercise, assisted upper limb exercise in supported sitting
5. Standing at bedside with or without aids
6. Standing and marching with minimal assistance

Definition of walking
Walk for 5 metres at the minimum with or without aids.

Table showing a list of equipment used for mobilisation programme

Model	Manufacturer	Origin
Sara Combilizer	ArjoHuntleigh	Sweden
MOTOMED LETTO 2	Reck	Germany
Arjo Walker GCB4100-031	ArjoHuntleigh	Sweden
Minipress 4100	Shuttle	U.S.A.
Static bicycle ES-110	Golden Horse Company	China
Theraband Professional Non-latex		
P02901 REV 2		
P02902 REV1		
P02903 REV1	The Hygenic Corporation	Malaysia
Walking Frame 4172	Golden Horse Company	China
Rollator 4081	Golden Horse Company	China

Part C: Recording of data
- The following data are recorded electronically for each mobilisation session
- General information:
  o Subject details: number, age, sex, speciality of patient, admission type (emergency or clinical, operative or non-operative)
  o APACHE IV scores upon admission
  o Attendance date and attendance number
- Attended session details
  o MRC grading
  o Absence of exclusion criteria
  o Mobilisation level performed
  o Completeness of mobilisation session, reason for incomplete session/termination
- Outcome measurements:
  o ICU mobility score
  o Length of ICU stay and hospital stay
  o Ventilator days
  o Discharge destination of patient: home, convalescence hospital, acute hospital, death

Part D: table showing the predefined exclusion criteria for the early mobilisation programme

Respiratory system
On prone ventilation
Cardiovascular system
On antihypertensive therapy for hypertensive emergency
Bradycardia requiring pharmacological treatment or awaiting pacemaker insertion
Neurological System
Very agitated or combative patient
Uncontrollable raised intracranial pressure above target range or need frequent drainage
Active seizures
Spinal precautions (pre-clearance or fixation)
Rapidly developing neuromuscular disease
Others
Active gastrointestinal blood loss or other known uncontrolled active bleeding

Part E: table showing the predefined exclusion criteria for out-of-bed mobilisation for the early mobilisation programme

Respiratory system
Respiratory rate <6 or >35/min
Positive end-expiratory pressure>10cmH2O, fraction of inspired oxygen >0.6
Oxygen saturation <92% or increase in fraction of inspired oxygen in recent 8hours
Marked ventilator asynchrony
Presence of femoral or subclavian extracorporal membranous oxygenation (ECMO)
Cardiovascular system
MAP<65mmHg or inotropes(e.g. Noradrenaline)>10mcg/min or increasing dose of inotropes
MAP>110mmHg or SBP>200mmHg
HR>120 or <40 bpm
BP variation >20% in past 8 hours
Echocardiogram showing left ventricular ejection fraction <30%
On transvenous or epicedial pacemaker with dependent rhythm
Presence of femoral intra-arterial balloon pump
Cardiac ischemia (ongoing chest pain or dynamic cardiac rhythm monitor changes)
Neurological System
Open lumbar drain (not clamped)
Others
Fever >38.5^{0}C
Unstable fracture for major parts (spine / pelvis / lower limbs long bone)
Major bleeding tendency (Platelet <30x106 /L, international normalised ration >2.5)
pH<7.28 and Base deficit< -3 or >8 mmol/L
Electrolyte derangement: Na<125 or >150, K<2.8 or >5.5 mmol/L
Large open surgical wound (chest / sternum / abdomen)
Presence of femoral sheath

Part F: Predefined set criteria to stop exercise

1. Perceived high degree of exertion (Borg's scale>13)

2. Patient distress (evidenced by non-verbal cues, gesture)
3. Patient does not want to continue due to fear, tiredness or dizziness
4. Heart rate increased or decreased by >20bpm
5. BP increased or decreased by >20mmHg
6. Respiratory rate >35/min or oxygen saturation <92%
7. Cardiac rhythm monitor showing major arrhythmia, ST or T changes
8. Decrease in alertness
9. Marked ventilator asynchrony

Part G: Ethics and institutional review board

Ethical review was sought and approved from the local institutional review board (review number: 2021.396) with waiver for individual consent, and this work complies with the Declaration of Helsinki. Individual consent was not applicable due to the before-and-after, consecutive nature of the programme.

Appendix Figure B: Tables showing the multivariate regression analysis results for the various outcomes tested

Multivariable linear regression with improvement in mobility score as outcome		
Variable	Estimate	P value
Early mobilisation	2.63	<0.001
Post-operative case	0.29	0.488
APACHE IV score	-0.01	0.172
Female gender	0.06	0.886
Age (years)	-0.02	0.187
Endotracheal intubation	0.09	0.824
ICU LOS	-0.04	0.538
Death	-1.79	0.001
Physiotherapist ICU attendance (days)	0.12	0.155
Multivariable linear regression with ICU hospitalisation as outcome		
Variable	Estimate	P value
Early mobilisation	0.5	0.29
Post-operative case	-1.22	0.02
APACHE IV score	-0.01	0.2
Female gender	0.14	0.77
Age (years)	-0.04	0.03
Endotracheal intubation	0.28	0.6
Death	0.68	0.31
Physiotherapist ICU Attendance	1.34	<0.001
Multivariable linear regression with hospitalisation after ICU stay as outcome		
Variable	Estimate	P value
Early mobilisation	-20	0.724
Post-operative case	181	0.003
APACHE IV score	0.01	0.991
Female gender	-75	0.15
Age (years)	0.8	0.541
Endotracheal intubation	66	0.264
ICU length of stay	8	0.509
Death	-121	0.359
Physiotherapist ICU attendance (days)	-5.3	0.74
Difference in ICU mobility scores	-8.5	0.404

Appendix C: Data sharing

Dataset containing individual participant details cannot be shared due to limitations from institutional review board. Kindly contact corresponding author for further information regarding data sharing requests.