feeding [healthy mice: lean n = 8, obese n = 9; fed CLP mice: lean n = 7, obese n = 10; fasted CLP mice: lean n = 9, obese n = 9]. Muscle weakness was assessed in a second mice experiment examining ex vivo muscle force [healthy mice: lean n = 17, obese n = 15; fed CLP mice: lean n = 15, obese n = 15]. Mice were generated by providing 12-week old male C57BL/6J mice with ad libitum 10% fat chow or 45% fat chow for 12 weeks prior to the septic insult. Also, in matched lean (BMI < =25 kg/m2) and overweight/obese (BMI >25 kg/m2) prolonged critically ill patients and healthy controls, we compared markers of muscle wasting (m. vastus lateralis biopsies (n = 102) and m. rectus abdominis biopsies (n = 86)) as well as muscle weakness, quantified by Medical Research Council sum scores (n = 278).
Results: Five days of sepsis reduced body weight similarly in lean and obese mice, with more fat loss in the obese ($p < =0.03$). Lean CLP mice, but not the obese, showed reduced muscle mass ($p < =0.04$), muscle protein content ($p < =0.06$), myofiber size ($p < 0.01$), and muscle and hepatic triglyceride content ($p < =0.06$), irrespective of administered feeding. Obese CLP mice maintained normal maximal muscle force, whereas in lean CLP mice, maximal muscle force decreased ($p < 0.01$) and recovered less from fatigue ($p < 0.01$). These differences between lean and obese CLP mice coincided with signs of more effective hepatic fatty acid and glycerol metabolism, and ketogenesis in the obese. Also overweight/obese critically ill patients showed preserved myofiber size, while myofiber size reduced in lean patients ($p = 0.02$ in m. vastus lateralis biopsies, $p = 0.01$ in m. rectus abdominis biopsies). Furthermore, fewer overweight/obese patients suffered from muscle weakness, assessed 8 days post-ICU admission ($p < 0.01$).
Conclusions: In conclusion, during critical illness premorbid obesity, but not nutrition, facilitated utilization of stored lipids and attenuated muscle wasting and weakness.

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Physical outcome measures for critical care patients following intensive care unit (icu) discharge

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Introduction: The aim of this study was to evaluate the most suitable physical outcome measures to be used with critical care patients following discharge. ICU survivors experience physical problems such as reduced exercise capacity and intensive care acquired weakness. NICE guideline 'Rehabilitation after critical illness' (1) recommends the use of outcome measures however does not provide any specific guidance. A recent Cochrane review noted wide variability in measures used following ICU discharge (2).
Methods: Discharged ICU patients attended a five week multidisciplinary programme. Patients' physical function was assessed during the programme, at 6 months and 12 months post discharge. Three outcome measures were included in the initial two cohorts. The Six Minute Walk Test (6MWT) and the Incremental Shuttle Walk test (ISWT) were chosen as they have been used within the critical care follow up setting (2). The Chester Step Test (CST) is widely thought to be a good indicator of ability to return to work (one of the programmes primary aims). Ethics approval was waived as the programme was part of a quality improvement initiative.
Results: Data was collected for the initial patients attending the programme (n = 13), median age was 52 (IQR = 38-72), median ICU LOS was 19 days (IQR = 4-91), median APACHE II was 23 (IQR = 19-41) and 11 were men. One patient was so physically debilitated that the CST or ISWT could not be completed however a score was achieved using the 6MWT. Another patient almost failed to achieve level 1 of the ISWT. Subsequent patients for this project (total n = 47) have all therefore been tested using the 6MWT. Good inter-rater and intra-rater reliability and validity have been reported for the 6MWT (3).
Conclusions: Exercise capacity measurement is not achievable for some patients with either the ISWT or the CST due to the severity of their physical debilitation. Anxiety, post-traumatic stress disorder and depression are common psychological problems post discharge (4), therefore using a test with a bleep is not appropriate. Therefore, the 6MWT is the most appropriate physical outcome measure to be used with critical care patients post discharge.

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Improving active mobilisation in a general intensive care unit

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Introduction: We aimed to improve the active mobilisation of Intensive Care (ICU) patients through a quality improvement (QI) project. Only 50% of ICU patients return to work within one year of discharge [1]: there are ongoing physical, psychological and cognitive problems after ICU discharge [1, 2]. Active mobilisation shortens hospital stay, increases return to independent function [3] and reduces delirium [3]. UK ICU standards, introduced in 2013, direct 45 minutes/day of active mobilisation in suitable patients.
Methods: Our ICU selected a multidisciplinary (MD) team in January 2014 to lead the mobilisation QI project and a commitment was made to the weekly collection and presentation of data. We used the ADEPT (aim, data, evidence, process, team) format. Our initial aim was 20 minutes of active mobilisation daily in 95% of suitable ICU patients. Patients had to be able to obey commands, to have achieved a degree of cardiovascular stability and must have no musculoskeletal injuries precluding mobilisation. Vasopressor use and invasive ventilation per se were not barriers to active mobilisation. Agreed forms of active mobilisation were active limb exercises (a booklet of exercises was developed), bed edge sit (dangle), sitting out of bed in a chair, standing and walking. Baseline data was collected and serial Plan, Do, Study, Act (PDSA) cycles were carried out.
Results: Baseline data (March – April 2014) showed 34% daily mobilisation in the target group. Performance improved to a median of 95% by November 2014 and has been maintained from January to November 2015 at 94%. Our daily mobilisation aim was increased to 30 minutes in June 2015 and to 45 minutes in October 2015. We saw a reduction of 1.2 days in our ventilator length of stay September 2014 as better reliability in active mobilisation was achieved.
Conclusions: The results of this QI project show that a MD approach to mobilisation can achieve results. The weekly data collection and discussion proved essential in advancing success. We had no extra resources or new funding to help us increase mobilisation time and we used our data and successive PDSA cycles to achieve success.

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Mobilization in patients on vasoactive drugs use – a pilot study.

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Introduction: Recent studies show that ICU survivors who needed mechanical ventilation often presents with neuromuscular weakness and functional impairment. ICU Acquired Weakness may develop even in critical patients who are immobilized for only a few days