Physical Activity Levels, Primary Care Costs and Quality-Adjusted Life Years (QALYs) in Survivors of Critical Illness

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Aims

- Daily physical activity (PA) appears commonly limited in Intensive Care Unit (ICU) survivors
- We assessed this using both subjective and objective methods, also recording primary care costs (PCC) and deriving Quality-Adjusted Life Years (QALYs) 18 months post-ICU discharge

Methods

- Subjects were drawn from the MUSCLE-UK Study[1] being (i) invasively ventilated for >48 hours and (ii) on ICU >7days. At 18 months post-ICU discharge we determined:
  - Daily step count (Sensewear activity monitors)
  - Health-related quality of life (SF-36 survey)
  - Clinical Frailty Scale Score[2] (Table 1)
  - QALYs; PCCs and Cost Utility Ratios (CURs)

Table 1: Clinical Frailty Scale[2]

A measure of frailty in geriatric and critically ill patients (Score - Frailty grade)

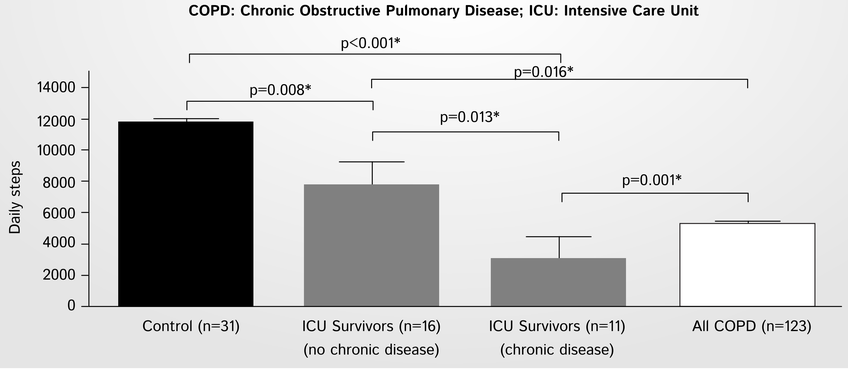
1 - Very fit
2 - Well
3 - Managing well
4 - Vulnerable
5 - Mildly frail
6 - Moderately frail
7 - Severely frail
8 - Very Severely frail
9 - Terminally ill

Results - Physical Function

- Twenty-seven patients were studied [14 female; age 55.3 years (95%CI 48.3 - 62.3); post-ICU discharge 573 days (95%CI 539 - 614)]
- Mean SF-36 Physical Component Summary score ± SD for ICU survivors (39 ± 13) was lower than that of norm population (50 ± 10)
- Median CFS was significantly higher in ICU survivors compared to age-matched controls: 4 [Interquartile Range (IQR) 2] versus 2 [IQR1]; p=0.002
- Mean daily step count was lower than that in normal controls, and worse in those with pre-existing chronic disease than without (Figure 1)

Figure 1: Daily Step Count in ICU and COPD Populations[3] versus Controls

COPD: Chronic Obstructive Pulmonary Disease; ICU: Intensive Care Unit



Results - Cost-Effectiveness Analysis

- At 18-months post-ICU discharge:
  i. Cumulative PCC (mean ± SEM) were 5-fold higher for ICU survivors than for normal controls (£1210 ± 274, £238 ± 11; p=0.003), and
  ii. QALYs (mean ± SEM) were significantly lower (0.92 ± 0.045, 1.16 ± 0.01; p=0.000)
- CFS was the only independent variable to contribute significantly to variation in QALYs (r^2=0.38; p=0.001).
- The strong correlation between loss of daily step count and CUR, was influenced by the degree of pre-morbidity (at 100-80% of normal population values) (Table 2; Figure 2)

At 85% pre-morbid baseline health of ICU survivors vs. controls, there was:

i. A difference in QALYs of 0.072
ii. A cost per QALY lost (CUR) of £13,502
iii. A loss of 107 daily steps

Figure 2: Effect of Level of Pre-Morbid Health on Cost Utility Ratio and Loss of Daily Step Count

Red area is the UK's National Institute for Health and Care Excellence (NICE) cost-effectiveness threshold (£20,000-30,000). ICU: Intensive Care Unit

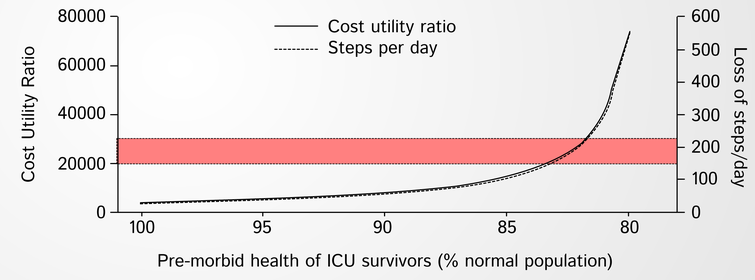


Table 2: Quality Adjusted Life Years (QALYs) and Cost Utility Ratios (CURs) in ICU survivors compared to non-ICU survivors for varying permutations of pre-morbid health.

***National representative sample of 22,166 British citizens.[4] QALY: Quality-adjusted life years; CUR: Cost-Utility Ratio; PCC: Primary Health Care Costs**

% Pre-Morbid Baseline Health of ICU Survivors vs. Controls*	QALY Difference Between ICU Survivors and Controls	CUR (£)	Loss of Daily Step Count
100	0.247	3935	31
90	0.130	7465	59
85	0.072	13502	107
80	0.014	70577	557

Conclusion

- Subjective and objective measures show that PA and QALYs are reduced 18 months after ICU admission.
- This model may inform the design of future rehabilitation trials in ICU patients.

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