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Critical care

Rehabilitation after critical illness –a pilot exercise programme to support intensive care unit survivors: A service evaluation

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Abstract

Background

Intensive care survival is increasing, resulting in patients living with physical and psychological symptoms for many months following their discharge from the ICU and hospital. Support in the community is often not available to support patients to return to higher levels of physical activity, previous employment or social interactions.

Objective

The aim of this service evaluation was to evaluate the addition of a semi- individualised, group-based exercise programme and education programme to our ICU follow up service and to measure physical and psychological outcomes of ICU survivors following participation in the programme.

Methodology

Patients attending the ICU follow up clinic and meeting the follow up criteria were offered the opportunity to attend a new weekly exercise group and education session. This service evaluation measured the uptake of this exercise group by ICU survivors and recorded physical and psychological outcomes before and after completion of the program.

Results

10 patients completed the program over 3 cohorts. All patients improved on their physical outcome measures and all patients subjectively reported a positive improvement in their mood, confidence and feelings of support. However, there was no improvement in psychological outcome measures. There were no adverse events throughout the programme.

Conclusion

In this small pilot service evaluation, a post ICU exercise program was a beneficial addition to a follow up service. Positive outcomes in physical function were demonstrated and patients reported a subjective improvement in mood and social inclusion.

INTRODUCTION

Survival from an intensive care unit (ICU) admission is improving, however it is widely reported that patients recovering from critical illness have impaired mobility and function often lasting for a number of years post critical illness.[1,2] The causes are multifactorial but ICU-Acquired Weakness is widely recognised as a major contributor to impaired function. Significant skeletal muscle wasting alongside physiological changes to nerve structure leads not only to significant weakness but structural changes to muscle fibre type[3] and exercise capacity. Patients have also reported cognitive or psychological changes[4] as well as social isolation due to low levels of functional ability and confidence.[5] These persistent symptoms post critical illness are knows as Post Intensive Care Syndrome (PICS).

There are multiple guidelines[6,7] which recommend ongoing rehabilitation for ICU survivors with a view to reduce the impact of PICS, by reviewing at 2-3 months post discharge to assess and provided onward referrals as appropriate and an exercise programme for completion at home.

There is minimal evidence available regarding class-based rehabilitation following an ICU admission, although those available demonstrated an improvement in health-related scoring but not exercise capacity[8] and reported success in supporting individuals and their families to start exercising again after a critical illness.[9,10]

It was found in the ICU follow up clinics at an acute London NHS Trust that patients regularly had ongoing mobility and functional impairments and an inability to participate in social or work activities up to 6 months post illness, despite the input from inpatient and community rehabilitation services at the time of discharge. This is supported by studies[1,2,10] that demonstrated the longer-lasting physical and socio-economic impact of ICU survivorship.

As a service evaluation, this project was not classed as research, therefore formal ethical approval was not required. It was registered and approved by the Imperial College Healthcare NHS trust/local (audit number 780). The aim of this service evaluation was to evaluate the addition of a semi- individualised, group-based exercise programme and education programme to the ICU follow up service and to measure physical and psychological outcomes of ICU survivors following the programme.

METHOD

DESCRIPTION OF SERVICE

All patients who spent four days or more in ICU, across the three ICUs at a London NHS Trust, meeting the criteria to be followed up were invited to join the exercise programme after review at either the six week or three month follow up post ICU discharge.

The criteria to be followed up were:

- Four or more days in ICU, not due to a pathway i.e. UGI surgical patients unless indicated;
- patients who have on-going physical rehabilitation needs that cannot be met by community therapy services;
- patients who are cognitively and physically able to participate in a class.

Patients were not followed up if they:

- suffered from severe or uncontrolled heart failure or cardiac arrhythmias;
- had other significant co-morbidities rendering them unable or unsafe to exercise;
- would attend another established exercise programme, such as cardiac rehabilitation.

Any patients meeting the criteria and consenting to the programme attended a pre-assessment appointment where on-going issues and goals were discussed as well as baseline outcome measures collected.

The programme was held once weekly for 6 weeks and consisted of an hour-long circuit-based exercise programme with a mix of strengthening and cardiovascular exercises appropriate to the individual. The exercise class was followed by an educational talk provided by members of the MDT. The topics covered were the medical impact of critical illness, the psychological impact of critical illness, nutrition in critical illness and recovery, fatigue management, cognitive changes in critical illness, and the patient perspective of critical illness and recovery.

SERVICE EVALUATION METHODS

Of those referred to the programme, records were taken for how many were willing to participate, attendance levels and reasons for non-attendance. Demographic information including age, gender and reason for ICU admission was also recorded, as were any adverse events occurring during the programme using an adapted adverse event tool from the Woodbridge et al study.[11]

Outcome measures were recorded pre and post programme to tailor individual exercise regimes, measure individual patient progress, and as part of the service evaluation. The outcome measures used were the 1-minute sit to stand test (STS), 6-minute walking test (6MWT) or Timed Up and Go (TUAG) if patients were unable to complete the 6MWT. The EQ – 5D – 3L, Hospital anxiety and depression scale (HADS) and the Work and Social Adjustment Scale (WSAS) were used to collect psychological and social outcomes. Subjective feedback from patients was also collected.

RESULTS

33 patients were referred into the programme between June 2022 and May 2023. Three patients declined to attend; six patients withdrew from the waiting list prior to being enrolled. Three patients were not medically fit at the time of assessment and three patients did not respond to correspondence regarding the programme.

18 patients were enrolled into the programme; four patients withdrew at short notice due to travel issues. 11 patients across three cohorts completed the programme. One patient did not attend the post assessment and one patient withdrew twice due to illness, so no post programme data was recorded for them (Table 1).

The median age of participants was 57 years old, 73% were male and the median time from ICU discharge to attending the programme was six months. (Table 2)

PHYSICAL FUNCTION OUTCOME MEASURES

Two patients were unable to complete the sit to stand in one minute at pre-assessment due to poor balance, but all nine patients attending the post programme assessment completed the test at this point. The median change was eight repetitions (Table 3).

Three patients were unable to complete the 6MWT at pre-assessment. All nine patients attending the post programme assessment completed the 6MWT, with a median improvement of 60metres. At pre-assessment, three patients required standing or seated rests during the test, no patients required a rest at post assessment (Table 3).

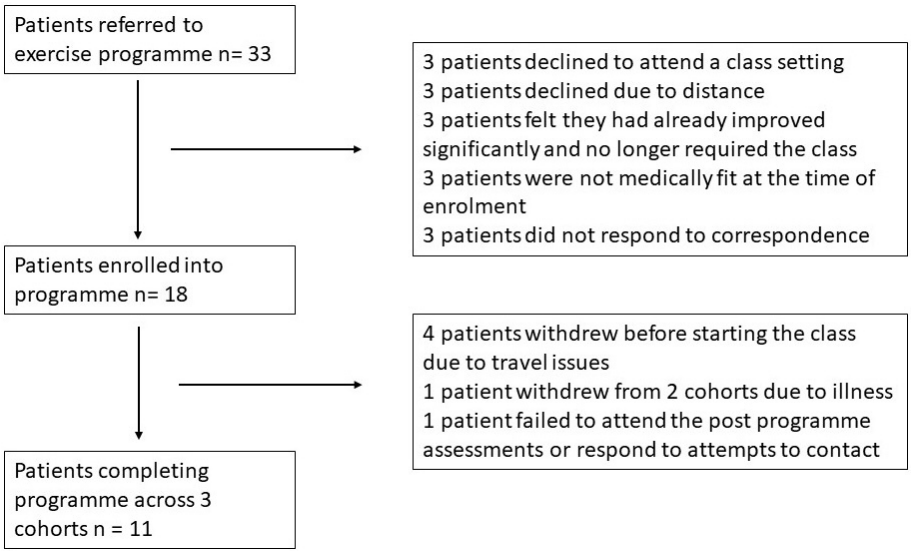

Table 1. Flow chart of patient enrolment

Table 2. demographics for patients who participated in the exercise programme

Patient characteristics	No. (%)
Gender	
Male	8(73)
Female	3 (27)
Age Median (IQR)	59 (47 – 70)
Reason for admission to ICU	No. (%)
COVID	1 (9)
Cardiac event/ surgery	3 (27)
General surgery	2 (18)
Neuro surgery	2 (18)
Thoracic surgery	1 (9)
Respiratory failure	1 (9)
Trauma	1 (9)

Two patients demonstrated an improved Timed Up and Go outcome at the post assessment (Table 3).

PSYCHOLOGICAL OUTCOME MEASURES

Table 4 demonstrates the results of the HADS, where a small improvement was seen. Results at both pre and post assessment levels indicate that the majority of patients had abnormal scores according to the scoring criteria and should be referred for on-going psychological input.

The WSAS shows scores for only seven of the nine patients; one was retired and one did not complete the form. Two patients had returned to work at pre-assessment. At post assessment, five patients had returned to work, two of whom were in a modified role. Generally, the results show an improvement in patients' ability to perform social and work-related tasks (Table 4).

EQ-5D-3L AND PATIENT HEALTH SCORING VAS

At the initial assessment point, 100% of patients reported some problems with mobility and all patients scored themselves having some or significant problems with pain and depression. 44% of the patients also reported significant problems completing ADL's. Following completion of the rehabilitation programme, 33% of patients reported themselves having no problems with mobility, an increase of 10% from pre-programme numbers. There was a reduction of 33% in those scoring themselves having significant problems completing ADL's. At the post assessments, 100% of the patients scored themselves as experiencing some pain, and scores for self-care did not change between the two assessment points (Table 5). Using the VAS, all patients marked their health score as improved between the two assessment points, with a median improvement of 22.

Table 3. Physical function outcome measures

	Pre	Post	Difference
STS in reps Median (IQR)	15 (6 – 20.5) (n=11)	23 (20.5 – 25.5) (n=9)	8 (3 – 15.5)
6MWT in Metres Median (IQR)	376 (200 – 419.5) (n =9)	420 (276 – 474.5) (n=9)	60 (40 - 86)
TUAG in Seconds Median (IQR)	25.7 (22.5 – 31.5) (n=4)	15.5 (n=2)	16

Table 4. Psychological outcome measures

	Pre	Post	Difference
HADS Anxiety Median (IQR)	9.5 (8 – 11) (n = 10)	9 (7.5 - 12) (n= 9)	
HADS Depression Median (IQR)	8.5 (7-12) (n=10)	7 (6 - 11) (n= 9)	
WSAS Median (IQR) (n=XX)	23 (12 - 31) (n=7)	14 (6 - 16) (n=7)	9 (0 – 18) (n = 7)

Table 5. EQ-5D-3L

	Mobility Pre (%)	Mobility Post (%)	Self care Pre (%)	Self care Post (%)	ADL's Pre (%)	ADL's Post (%)	Pain Pre (%)	Pain Post (%)	Depression Pre (%)	Depression Post (%)
1	2 (22.2)	3 (33.2)	5 (55.5)	5 (55.5)	2 (22.2)	4 (44.4)	0	0	0	2 (22.2)
2	7 (77.7)	6 (66.6)	4 (44.4)	4 (44.4)	3 (33.3)	4 (44.4)	8 (88.8)	9 (100)	8 (88.8)	5 (55.5)
3	0	0	0	0	4 (44.4)	1 (11)	1 (11)	0	1 (11)	2 (22.2)

Where 1 relates to "no problems", 2 relates to "some problems" and 3 relates to "significant problems"

At the post assessment, five patients were referred for on-going psychology input, four were referred to local gyms for on-going exercise provision and two patients were assisted with financial aid applications.

The subjective feedback from patients was all positive. Patients reported feeling less isolated in their recovery "the class has helped me realise I am not alone in what I'm feeling". Patients felt sharing their experiences with others in a similar situation helped them significantly and they felt more confident returning to exercise "I'm already doing more and feel more confident (at week 3)". There were no adverse events recorded during the programme.

DISCUSSION

The pilot programme demonstrated that offering an exercise programme following critical illness is a beneficial and safe addition to follow up services.

All the patients demonstrated positive improvements physically after participation in the exercise programme. The psychological outcome measures did not show an improvement despite patients subjectively reporting they felt better psychologically and reporting feeling less isolated having shared their experiences with others in a similar position. Quality of life scores improved in some areas such as mobility and completing ADLs. Patients reported improved confidence in continuing to exercise following the programme. Although this was not explored in detail, it is in keeping with the barriers outlined in literature covering rehabilitation following critical illness.[10,12]

Whilst there were positive outcomes for patients, there were limitations to the pilot programme. Being a service evaluation with no control group, there is no way of determining whether the positive results demonstrated may have occurred naturally over time regardless of whether patients participated in the rehabilitation programme or not.

The service evaluation ended prematurely leading to small patient numbers and limited data. The Trust where patients were recruited runs three follow up clinics on different sites using many different members of staff and whilst the programme was well advertised, unfortunately only a small number of patients were referred. Data was not recorded regarding how many patients were offered the service in follow up clinic and declined at the point of discussion. Without this data, it cannot be established how many patients were offered the class and declined, and for what reason, therefore the actual "need" was difficult to determine. A high dropout rate was experienced and some declined to attend, which may be attributed to two main factors: the Trust is a tertiary centre so patients were referred from a large geographical area; the programme was only held at one site, on one day a week resulting in travel and attendance restrictions for participants.

The programme was run in a cohort design rather than a rolling programme due to staffing and time pressures of other clinical and non-clinical duties for the therapists involved. This design however, led to prolonged waiting times with at least an 8 week wait occurring between cohorts. The design, alongside time constraints of the team, led to small group numbers and when patients withdrew at short notice their spaces were not able to be filled. A rolling programme may counteract these issues as patients can join the programme at any time point. There would however, be an increased time burden on the team to undertake pre and post assessments on a regular basis, rather than at the beginning and end week of the 8-week block.

This service evaluation did not collect any qualitative outcome measures related to social integration or confi-

dence. This would be beneficial in any future programmes as the health-related scores did not always reflect the feedback received from participants. The outcome measures chosen may not be valid for use in the post ICU population and therefore might not be strong indicators to demonstrate meaningful recovery within this demographic. This would be worth considering in any future programmes or research in this field.

To establish this programme in the long term, it would be recommended to implement an improved method of recording the offer of the programme to patients, and the outcome of this offer. Increased staffing or a dedicated staff member for this programme, considering a rolling programme, and additional classes offered would allow for increased numbers accessing the programme.

Key points

1: A follow up exercise programme may be a beneficial addition to an ICU follow up service if adequate staffing allows.

2: Participation in the post ICU exercise programme was associated with improvements in physical function.

3: Patients reported they enjoyed the social, educational and supportive aspects of the programme and felt more confident to return to activity outside the programme setting. It would be beneficial to collect more data regarding this in future programmes.

4: None of the enrolled patients were able to access this support from any other community service, highlighting a service need for the post ICU population.

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DECLARATIONS OF INTEREST

There are no declarations of interest to be made

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