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Research Article

Return to work during first year after intensive care treatment and the impact of demographic, clinical and psychosocial factors

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ABSTRACT

Objectives: To describe work participation in survivors during first year after intensive care unit discharge and examine the impact of selected demographic, clinical and psychosocial factors on return to work 12 months after discharge.
Research methodology/Design: A predefined sub-study (prospective cohort study) of a randomised controlled trial.
Setting: A Norwegian single-centre university hospital. Medical and surgical adult intensive care survivors, working/on sick leave before admission, in the intensive care unit ≥24 h, were included.
Main outcome measures: Return to work three, six and 12 months after discharge, and impact of age, pre-existing comorbidities, previous serious life events, coping ability, hope and social support on return to work 12 months after discharge.
Results: Included were 284 patients, with mean age 47 years (SD 13.9) and 47 % women. One year after discharge, 69 % were back at work. In the regression analysis, with working at 12 months (yes/no) as the dependent variable, 178 patients, completing questionnaires at three as well as 12 months, were included. Lower age (OR 0.96, 95 % CI [0.93–0.99]), lower pre-existing comorbidities (OR 0.65, 95 % CI [0.43–0.97]), previous serious life events (OR 6.53, 95 % CI [2.14–19.94]), and greater hope at three months (OR 1.09, 95 % CI [1.01–1.17]) were all independently associated with higher odds of returning to work.
Conclusion: Following intensive care, age, pre-existing comorbidities, experience of previous serious life events and hope all have a significant impact on return to work, and are important variables to consider during intensive care treatment and rehabilitation.
Implications for clinical practice: Attention must be paid to patients with prior working capability to ensure return to work after intensive care treatment. Older adults with pre-existing comorbidities might benefit from early, individualised rehabilitation to regain previous working capacity. In addition, there is also a need to support patients' hope during and after critical illness.

Introduction

Critical illness and intensive care unit (ICU) treatment may lead to physical, cognitive and mental impairments, defined as post-intensive care syndrome (Elliott et al., 2014), which also may affect patients' working ability (King et al., 2019). Return to work can indicate successful rehabilitation following ICU treatment, and patients achieving this report higher quality of life (QoL) and less depression than patients

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not returning to work (Das Neves et al., 2015; McPeake et al., 2019; Myhren et al., 2010). It is also of economic importance for patients and society (Griffiths et al., 2013; Kamdar et al., 2017b), due to loss of income and need for social security.

Among previously employed ICU patients, only 60 % returned to work one year after ICU discharge in a recent meta-analysis (Kamdar et al., 2020). The period before return to work varied in length, depending on pre-existing comorbidities (Kamdar et al., 2017b, 2020) and complications caused by the critical illness (Agard et al., 2012; Gabbe et al., 2016; Hodgson et al., 2017; Kamdar et al., 2017b; Norman et al., 2016), leading to physical weakness (Herridge et al., 2003; Kamdar et al., 2017a; 2017b), fatigue (Herridge et al., 2003) and disability (Herridge et al., 2003; Hodgson et al., 2018; 2017; Kamdar et al., 2017a; 2017b). Other reasons for delayed or lack of return to work are higher age (Gabbe et al., 2016), anxiety and depression (Hodgson et al., 2018), post-traumatic stress (PTS) (Hodgson et al., 2018), work-related stress, job retraining (Herridge et al., 2003), unavailability of rehabilitation (Das Neves et al., 2015) and voluntary retirement (Herridge et al., 2003; 2011; Kamdar et al., 2017a).

Sense of coherence (SOC) is a way of coping with the complexity of stressors confronting us throughout life, consisting of three components: comprehensibility (making sense of adversity), manageability (resources to meet challenges) and meaningfulness (challenges are worth engagement) (Antonovsky, 1993). A high SOC is associated with better mastery, quicker recovery, better mental health and QoL after severe disease (Haugan et al., 2017), while higher PTS symptoms were associated with lower SOC score after ICU discharge (Valso et al., 2019). It may therefore be pertinent to investigate the impact of SOC on return to work after critical illness. Other psychosocial aspects that might affect working ability are hope and social support. The potential value of hope in therapy for critically ill patients has been described (Cutcliffe, 1996), and social support was positively associated with mental health-related QoL among ICU survivors (Langerud et al., 2018). However, the influence of these factors on return to work after ICU treatment has not yet been explored.

The aims were to describe work participation in ICU survivors during the first year after discharge from the ICU, and to examine the impact of selected demographic, clinical and psychosocial factors on return to work 12 months after discharge.

Method

Design

The present prospective cohort study is an a priori planned sub-study of a randomised controlled trial (RCT) on nurse-led follow-up consultations with discharged ICU patients (Valso et al., 2020).

Participants and setting

Adult ICU patients (≥24 hrs ICU stay) discharged from five ICUs under Oslo University Hospital were included (n = 523) in the RCT soon after ICU discharge. Patients with self-inflicted injuries, unable to understand Norwegian, transferred to local hospitals, with severe head injuries, cognitively impaired, with terminal diseases or psychiatric disorders were excluded. A nurse from the research team approached patients in the ward immediately after ICU discharge. She collaborated with a ward nurse to decide whether patients met the eligibility criteria. If they were delirious or incapable of receiving information at this point, recruitment was postponed until their condition improved.

Enrolled patients completed the PTSS 10-I scale, part B, with ten items evaluating presence and intensity of PTS symptoms in the past seven days, ranging from 1 (never) to 7 (always), with a total score from 10 to 70. Higher scores indicate a higher level of stress (Stoll et al., 1999). Patients with a score ≥25, indicating moderate to severe PTS symptoms, were randomised to an intervention group (IG), receiving two to three nurse-led follow-up consultations in addition to standard care, or to a control group (CG) receiving standard care only. Standard care included early mobilisation, physical therapy and physical rehabilitation (Valso et al., 2020), and further follow-up from primary healthcare. Patients with scores <25 were included in an observation group (OG), also receiving standard care (Fig. 1). The consultations were performed by specially trained ICU nurses and based on cognitive behavioural therapy, narrative methods (Skogstad et al., 2015) and salutogenic theory (Antonovsky, 1987).

There were no statistically significant differences between IG and CG regarding PTS symptoms or SOC (Valso et al., 2020), and their likelihood of returning to work was very similar (OR = 0.96, 95 % CI [0.32–2.88], p = 0.941). Since we found no effect of the intervention, we chose instead to examine factors associated with return to work, regardless of the PTSS score. Therefore, IG, CG and OG (n = 299) were merged into one group in the present study. Only patients reporting being employed or on sick leave before admission, with a potential to return to work, were included (Fig. 1).

The study was approved by the South-Eastern Norway Regional Ethics Committee (reference number: 2012-1715), the hospital's data protection officer was informed, and the study is registered in clinicaltrials.gov (NCT02077244). All patients provided written informed consent before participation (Valso et al., 2020).

Data collection

All patients completed self-reported paper questionnaires in the hospital ward soon after ICU discharge (baseline), and sent by post three, six and 12 months later, with a reminder after three weeks if necessary. Three nurses from the research team were responsible for sending the questionnaires. Participants were contacted by the study 5–10 times during the 12 months. Clinical data were collected from patient records and the local ICU registry immediately after enrolment. Demographic and clinical characteristics, including SOC, were collected within a week of ICU discharge, while hope and social support were collected at three months to reduce the number of questionnaires when patients were still potentially affected by their critical illness.

Measures

Data were collected on educational level, diagnosis for admission, mechanical ventilation (yes/no), length of stay in hospital and ICU (days), serious life events during previous year (deaths in family/close friends, separation/divorce, serious housing/financial problems, losing job) (yes/no), and previous psychiatric problems (yes/no).

The American Society of Anaesthesiologists Physical Status Classification (ASA-PS) was used to report comorbidities before critical illness, ranging from grade I (normal health) to VI (brain dead) (Ringdal et al., 2013). Illness severity was measured by the New Simplified Acute Physiology Score (SAPS II), with a total score of 0–163, a higher score indicating higher risk of death (29 equals 10 % mortality) (Le Gall et al., 1993). Information was obtained on previous medication (hypnotics, anxiolytics/antidepressants and analgesics with/without prescription) and medication in ICU (benzodiazepines, opioids, antipsychotics, dexmedetomidine, clonidine and regional analgesics).

Patients reported current employment status at all four measurement points as: full-time, part-time, homemaker, retired, unemployed, military service, student, disabled or on sick leave. Those who reported full- or part-time work, homemaker, military service or being students were categorised as "working," while all others were categorised as "non-working".

SOC was measured by SOC-13 with three dimensions: comprehensibility (five items), manageability (four items) and meaningfulness (four items), with a scale from 1 to 7. Higher score reflects higher coping ability in facing challenges (range 13–91) (Antonovsky, 1987). The SOC-13 has shown acceptability, reliability and validity in various

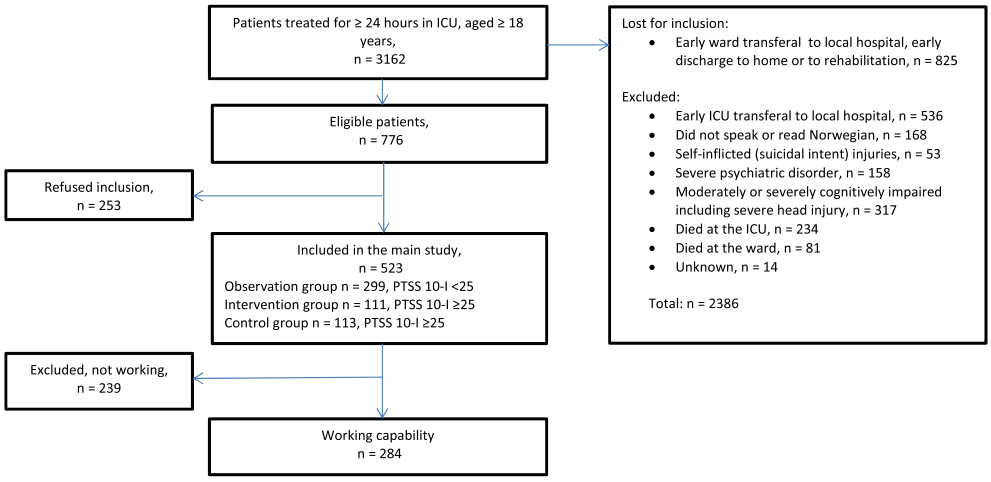

Fig. 1. Working capability sample baseline.

populations (Antonovsky, 1993; Eriksson and Lindstrom, 2005), including trauma patients after ICU treatment (Hepp et al., 2005). Cronbach's alpha was computed at baseline as a measure of internal consistency and was 0.82 (values above 0.7 indicate acceptable reliability) (Glen, 2022). The Herth Hope Index (Herth, 1992), Norwegian version (HHI-N), was used to measure hope; it consists of 12 items with a response from 1 (strongly disagree) to 4 (strongly agree). Higher total scores indicate stronger hope (range 12–48), and the index has shown satisfactory validity and reliability in different patient groups (Herth, 1992; Wahl et al., 2005). In our sample, Cronbach's alpha at three months was 0.85. Social support was measured by the revised Social Provision Scale, containing 16 items with responses from 1 (strongly disagree) to 4 (strongly agree) (range 16–64), for the social provisions of attachment, social integration, reassurance of worth and opportunity for nurturance (Bondevik, 1997), The scale has been validated in different populations (Cutrona and Russell, 1987; Weiss, 1974), including ICU survivors (Langerud et al., 2018). In our sample, Cronbach's alpha at three months was 0.82.

Statistical analysis

SPSS Statistics version 25 (IBM Corp, Armonk, New York, USA) and Stata version 15 (StataCorp, College Station, Texas, USA) were used for statistical analysis. Descriptive data are presented as means with standard deviation (SD) for continuous data and counts and percentages for categorical variables (Table 1). Pearson Chi-Square tests and independent sample t-tests were used to investigate differences between responders (included in the logistic regression analysis) and non-responders at three as well as 12 months (Table 2). A univariate logistic regression analysis with return to work at 12 months as dependent variable was performed (Table 3). Variables associated with return to work with a p value ≤0.1 were further included in a multivariate logistic regression analysis (Table 3). The independent variables were examined for multicollinearity, which was <0.3 for all variables studied, and results are expressed as odds ratios (OR) with 95 % confidence intervals (CI). Statistical significance was set at p-value ≤0.05, and all tests were two-sided.

Results

Among 523 discharged ICU patients eligible for the RCT, 284 (54 %) were considered as having working capability prior to hospital admission and were included in the present study (Fig. 1). Mean age was 47 years (SD 13.9), 132 (47 %) were women and 153 (54 %) had received mechanical ventilation. Mean ASA-PS score was 2 (SD 0.9), mean SAPS II score 23 (SD 12.5) and mean ICU stay was seven days (SD 10.4) (Table 1).

Table 1
Demographic and clinical characteristics of the working capability sample at baseline and three months after ICU treatment (n = 284).

Characteristics	Mean (SD)	N (%)
Age (year)	47 (13.9)	
Sex		
• Female		132 (46.5)
• Male		152 (53.5)
Educational level		
• Primary school		18 (6.4)
• Secondary school		107 (38.1)
• College/university		156 (55.5)
Diagnosis for hospitalisation		
• Trauma		64 (22.5)
• Acute surgery		45 (15.8)
• Elective surgery		59 (20.8)
• Organ transplant		36 (12.7)
• Cancer		46 (16.2)
• Internal medicine		34 (12.0)
Mechanical ventilation*		153 (53.9)
Previous serious life events*		80 (28.2)
LOS[1] ICU[2] (days)	7 (10.4)	
ASA[3]prehospital (group I-VI)	2 (0.9)	
SAPS[4]II (range 0–163)	23 (12.5)	
PTSS 10-I[5] (range 10–70)	26 (12.7)	
SOC[6] (range 13–91)	70 (11.8)	
HHI-N[7](3 months after ICU) (range 12–48) (n = 207)	39 (5.0)	
SPS[8] (3 months after ICU) (range 16–64) (n = 209)	58 (5.4)	

Abbreviations: [1]Length Of Stay, [2]Intensive Care Unit, [3]American Society of Anesthesiologists Physical Status Classification, [4]Simplified Acute Physiology Score, [5]Post-Traumatic Stress Symptoms10-Intensive Care Screen, [6]Sense of Coherence, [7]Herth Hope Index-Norwegian version, [8]Social Provision Scale.
* Yes = 1, no = 0.

There were statistically significant differences between responders and non-responders at three as well as 12 months, with more men, individuals with lower education, and those with previous serious life events among non-responders (Table 2).

Before admission, 241 patients were employed (85 %) and 43 (15 %) were on sick leave. At three, six and 12 months after ICU discharge, there were 196, 177 and 184 responders respectively. Of these, 71 (36 %), 94 (53 %), and 127 (69 %) had returned to work.

In the univariate logistic regression analysis, age, previous serious life events, pre-existing comorbidities and hope at three months were associated with return to work at 12 months (Table 3). In the

Table 2
Differences between responders (included in the logistic regression analysis) and non-responders at three as well as 12 months (n = 284).

		Responders (N = 178)		Non-responders (N = 106)		p-value
		N	%	N	%	
Sex	Male	87	48.9	65	61.3	0.042
	Female	91	51.1	41	38.7	
Educational level	Primary school	8	4.5	10	9.5	0.042
	Secondary school	61	34.7	46	43.8	
	University/college	107	60.8	49	46.7	
Previous serious life events		41	23.0	39	36.8	0.013

multivariate analysis, age, previous serious life events, pre-existing comorbidities and hope at three months were independently statistically significantly associated with return to work at 12 months (Table 3). The results also showed that for every year of increased age, the odds of returning to work decreased by 4 %, and for every unit increase in prehospital ASA the odds decreased by 35 %. Further, when hope at three months increased by one unit, the odds of return to work increased by 9 % (Table 3).

Discussion

In this study, about one-third of ICU survivors employed or on sick leave before hospital admission had returned to work three months after ICU discharge. This figure increased to one-half after six and two-thirds after 12 months. Factors significantly associated with increased return to work at 12 months were lower age, lower grade of pre-existing comorbidities, previous serious life events and higher hope levels three months after ICU discharge.

The rate of return to work 12 months after ICU discharge is comparable to findings from two recent meta-analyses (Kamdar et al., 2020; McPeake et al., 2019). However, these authors studied general ICU patients, but excluded cardiac and brain-injured patients (McPeake et al., 2019) and patients treated in neurological ICUs (Kamdar et al., 2020). In our study, only patients with severe brain injury or moderately or severely cognitively impaired were excluded. Exclusion of more patients, as in the meta-analyses (Kamdar et al., 2020; McPeake et al., 2019), might have resulted in a larger proportion of survivors returning to work.

Table 3
Univariate and multivariate logistic regression analyses of return to work 12 months after ICU treatment.

	Univariate (n = 166–184)			Multivariate (n = 172)		
	OR	95 % CI	p-value	OR	95 % CI	p-value
Age (year)	0.97	0.94–0.99	0.007	0.96	0.93–0.99	0.003
Sex						
• Male (reference)						
• Female	1.20	0.64–2.25	0.564	0.96	0.46–1.99	0.904
Educational level						
• Primary school (reference)						
• Secondary school	0.43	0.08–2.26	0.322			
• College/university	0.80	0.16–4.06	0.786			
Diagnosis for hospitalisation						
• Trauma (reference)						
• Acute surgery	1.41	0.52–3.84	0.502			
• Elective surgery	1.79	0.69–4.65	0.233			
• Organ transplant	1.08	0.37–3.15	0.885			
• Cancer	1.44	0.51–4.07	0.489			
• Internal medicine	1.07	0.35–3.28	0.904			
Mechanical ventilation*	0.79	0.42–1.49	0.471			
Previous serious life events*	2.42	1.05–5.62	0.039	6.53	2.14–19.94	0.001
Previous psychiatric problems*	0.95	0.38–2.34	0.905			
LOS[1] hospital (days)	0.10	0.98–1.01	0.590			
LOS ICU[2] (days)	0.99	0.96–1.02	0.381			
ASA[3] prehospital (group I-VI)	0.73	0.52–1.03	0.074	0.65	0.43–0.97	0.037
SAPS[4] II (range 0–163)	0.99	0.96–1.01	0.280			
PTSS[5] 10-I (range 10–70)	0.10	0.98–1.02	0.938			
SOC[6] (range 13–91)	1.01	0.98–1.04	0.644			
Medication in ICU*						
• Benzodiazepines	1.09	0.59–2.05	0.779			
• Opioids	0.74	0.08–7.25	0.794			
• Antipsychotics	1.19	0.40–3.50	0.757			
• Dexmedetomedine	1.11	0.50–2.42	0.804			
• Clonidine	1.02	0.30–3.46	0.976			
• Regional analgesics	0.89	0.48–1.67	0.721			
Medication before admission hospital*						
• Hypnotics	1.26	0.59–2.70	0.548			
• Anxiolytics/antidepressants	0.60	0.27–1.31	0.197			
• Analgesics without prescription	1.12	0.58–2.19	0.730			
• Analgesics with prescription	0.69	0.36–1.33	0.268			
HHI-N[7] (3 months after ICU) (range 12–48)	1.06	0.99–1.13	0.100	1.09	1.01–1.17	0.026
SPS[8] (3 months after ICU) (range 16–64)	1.05	0.99–1.11	0.108			

Demographic and clinical characteristics after discharge from (and 3 months after) intensive care unit treatment.
Abbreviations: [1]Length Of Stay, [2]Intensive Care Unit, [3]American Society of Anesthesiologists Physical Status Classification, [4]Simplified Acute Physiology Score, [5]Post-Traumatic Stress Symptoms10-Intensive Care Screen, [6]Sense of Coherence, [7]Herth Hope Index-Norwegian version, [8]Social Provision Scale.
This model explained 22% of the variance in the data (Nagelkerke R Square).
* Yes = 1, no = 0.

The association between higher age and lower return to work after critical illness has been described in major trauma patients working/studying prior to injury (Gabbe et al., 2016). We know of no other studies showing an association between lower return to work rate and increasing age. This might be because Norwegian patients can choose early retirement (at age 62) rather than resuming demanding work after ICU treatment (Amundsen, 2018). Consequently, we can speculate whether the association with age would have been present in a similar study in a country with a higher pension age.

There was no association between educational level and return to work in this study, although other studies have reported higher education as a predictor for returning to work after critical illness (Kamdar et al., 2020; Myhren et al., 2010). More than half of the patients in our sample had college or university education, and there was a statistically significant higher proportion of individuals with lower education among non-responders than responders at three as well as 12 months. Participation by non-responders might have altered the significance of educational level on return to work. Little variation in educational level among responders might explain why this variable was not significantly associated with return to work. This factor should clearly be considered in interpretation of our results.

Our findings show that higher pre-existing comorbidities decreased the return to work rate, consistent with previous studies of ICU-discharged patients with acute respiratory distress syndrome (Kamdar et al., 2017b, 2020), trauma patients (Gabbe et al., 2016), and a recent meta-analysis (McPeake et al., 2019). Accordingly, this knowledge could help to identify potential ICU survivors with a higher risk of delayed return to work, leading to preventative interventions such as focused rehabilitation and follow-up.

The present study revealed an interesting association between higher levels of hope three months after ICU discharge and return to work after 12 months. Hope is future-oriented and a powerful resource, providing strength, motivation and energy (Kylma and Vehvilainen-Julkunen, 1997), but the importance of hope in return to work after critical illness appears to be unexplored. In previous studies where ICU patients have been interviewed about hope, caregivers' commitment to convey positive expectations of handling stress and to help patients to overcome the difficulties, information about progress and confidence in the treatment were highlighted as significant factors (Cutcliffe, 1996; Miller, 1989). Also emphasised was the importance of maintaining a good relationship with relatives (ibid.). These results support our findings of the importance of strengthening hope during ICU treatment to increase the possibility of returning to work. Our findings, however, did not reveal an association between coping ability and return to work, although a high SOC has been associated with quicker recovery after severe disease (Haugan et al., 2017). Social support has previously been linked to higher mental health-related QoL among ICU survivors (Langerud et al., 2018). However, although patients returning to work after critical illness have reported higher QoL (Das Neves et al., 2015; McPeake et al., 2019), there was no association between social support and return to work in the present study. Interestingly, we found that those who experienced previous serious life events had higher odds for returning to work after ICU treatment. However, the OR was estimated with little precision and a very wide CI, and since only 28 % of participants had experienced such an event, these results should be evaluated with caution.

Study limitations

The present study has several limitations. No details about patients' previous job and any work demands were available. Discharge and rehabilitation information were self-reported with a lack of details about the rehabilitation process. These aspects might have affected the outcome. Differences in welfare schemes between Norway and many other countries might have influenced the return to work rate and limit the generalisability of our findings. Further, baseline questionnaires were completed when several patients were still severely affected by their critical illness, which might have led to fewer patients being included. In addition, since no validated tool for measuring delirium was used, we cannot rule out that some patients had delirium at the time of inclusion. Further, some patients were not included due to refusal to participate or early transfer to local hospitals, and we are unaware of whether these patients differed from those included. Moreover, non-responders at three as well as 12 months (not included in the regression analysis) had lower educational levels than responders, and response from these patients might have altered the association between education and return to work rate. Since hope was first measured at three months, we do not know whether three-month levels differed from baseline levels. In addition, the HHI-N used for measuring hope is designed for clinical settings for different patient groups when hope is threatened (Wahl et al., 2005), but data on hope when HHI-N is used after ICU discharge is lacking. Finally, the regression model explained only 22 % of the data variation, indicating that there are unexplored variables not investigated that could have affected outcome.

Conclusion

Among ICU survivors who are employed prior to hospital admission, over one-third had returned to work three months after ICU discharge, with this proportion increasing to two-thirds after 12 months. Factors significantly associated with return to work after 12 months were lower age, lower grade of pre-existing comorbidities, presence of previous serious life events and higher level of hope at three months. This may suggest a greater focus on these predictive factors, involving individualised rehabilitation starting during ICU treatment followed by outpatient care to improve functional, emotional and social outcomes, thus increasing the possibility of returning to work after critical illness.

Author agreement

All authors have made substantial contributions to all of the following: (1) the conception and design of the study, acquisition of data, analysis and interpretation of data, (2) drafting the article, revising it critically for important intellectual content, (3) final approval of the version to be submitted.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Clinical Trials registration number

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Ethical statement

The study was approved by Regional Ethical Committee South-East Norway with reference number 2012/1715 and the hospital's Data Protection Officer was informed.

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