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Changes in quality of life after medical intensive care

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Abstract *Objectives:* To determine outcome and changes in health-related quality of life (QOL) in medical intensive care patients.
Design and setting: Prospective comparison of QOL before and 6 months after intensive care unit (ICU) admission in a 12-bed non-coronary medical ICU of a university hospital.
Patients: All 325 consecutively admitted adult patients who spent at least 24 h on the ICU were eligible.
Measurements and results: QOL measurements were collected before and 6 months after ICU admission. Comorbidity classified by the Charlson index was 2.44 ± 1.96. Mean stay in the ICU was 10.4 ± 15.1 days, mean Acute Physiology and Chronic Health Evaluation II score was 23 ± 10. Cumulative mortality was: ICU 24 %, hospital 34 %, 6 months 43 %. Relative to baseline, follow-up interviews of 185 survivors revealed no significant changes in the overall QOL score ($p = 0.93$). The subscales basic physiological activities ($p = 0.07$) and normal daily activities ($p = 0.15$) showed a nonsignificant deterioration. A significant improvement was noted for the domain emotional state ($p = 0.013$).
Conclusions: Six months after admission to a medical ICU most survivors had regained their preadmission health-related QOL. Multivariate analysis showed that preadmission QOL, age, and severity of illness were most strongly associated with follow-up QOL. Of the survivors 86 % were living at home, and all but one of those previously in employment had returned to their former work. Most patients (94 %) would undergo ICU treatment again if necessary.

Key words Quality of life · Intensive care · Outcome · Health status · Comorbidity

Introduction

Quality of life (QOL), or subjectively experienced health status, has increasingly been used to assess the effectiveness of intensive care therapy, and has also been proposed as a relevant outcome measure [1]. Most previous QOL studies have analyzed the outcomes of combined medical-surgical ICU populations [2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17]. Several authors have reported that medically treated patients have higher

Table 1 Demographic and clinical characteristics of study patients (*ICU* intensive care unit, *CCI* Charlson Comorbidity Index, *APACHE II* Acute Physiology and Chronic Health Evaluation II, *TISS* Therapeutic Intervention Scoring System, *QOL* quality of life). Increasing QOL score denotes worsening of quality of life

Characteristic	ICU admission ($n = 325$)	6 month follow-up[a] Survivors ($n = 185$)	Nonsurvivors ($n = 139$)	p[b]
Gender (men/women)	178/147	103/82	75/64	NS
Age (years)	58 ± 17 (18–95)	56 ± 18	62 ± 16	0.003
CCI	2.44 ± 1.96 (0–11)	1.95 ± 0.14	3.11 ± 0.16	< 0.0001
APACHE II, first 24 h	23 ± 10 (2–56)	19 ± 10	28 ± 9	< 0.0001
TISS, first 24 h	33 ± 13 (6–69)	29 ± 12	39 ± 13	< 0.0001
Mechanical ventilation (%)	59	45	78	< 0.0001
ICU length of stay (days)	10 ± 15 (2–128) median 5	9 ± 16 (2–128) median 4	12 ± 14 (2–77) median 8	NS
Overall QOL score, baseline	8.4 ± 6.4	6.4 ± 5.5	11 ± 6.5	< 0.0005

[a] One patient lost to follow-up
[b] Cox regression

short- and long-term mortality rates than surgically treated patients [5, 8, 12] and worse outcomes in terms of functional abilities and QOL [8, 18]. Previous QOL studies conducted in medical ICUs involved patients treated between 1977 and 1983 [4, 19, 20, 21], two included coronary care patients [19, 20], and only one [21] took comorbidities into account. We therefore prospectively examined the outcomes of noncoronary medical ICU patients and focused on the following points: (a) comorbidity and preadmission health-related QOL of patients admitted to our medical ICU; (b) influence of preadmission health status, severity of the acute illness, and age on QOL changes at the 6 month follow-up; (c) changes in the employment and residence status of survivors; and (d) survivors' recall of ICU treatment and their willingness to undergo such treatment again.

Patients and methods

The protocol was approved by the local ethics committee, and informed consent was obtained from all participants. The study was performed in a closed-format 12-bed noncoronary medical ICU of a university hospital between June 1997 and May 1998. All consecutively admitted adults (18 years of age or older) who remained in the ICU for more than 24 h were considered. Readmitted patients were excluded from the study.

Demographics and mortality

During the 1-year period a total of 619 patients were admitted to the ICU. Of these, 245 were excluded because of death or discharge within 24 h of admission, 28 patients because they were repeat admissions, and two because they were under 18 years. Measurements could not be obtained in ten others because a close family member was not available. Thus 325 patients entered the study, and their characteristics are presented in Tables 1 and 2. Death occurred in 78 in the ICU, 34 in hospital after discharge from the ICU, and 27 before the 6-month follow-up. Cumulative mortality was 24% in the ICU, 34.5% in the hospital, and 42.8% at 6 months.

Measurements

Within the first 24 h of their ICU stay eligible consenting patients/family members completed a baseline QOL personal interview questionnaire. Deaths were recorded initially from hospital records, physician, and family contact and were verified by reports obtained from the registry office. Study patients not reported to have died were contacted by telephone 6 months after admission, and a second questionnaire was completed by telephone. The survey was conducted by two trained interviewers, who were not involved in patient care in the ICU. Baseline and follow-up interviews were always conducted by the same interviewer. Information collected from all patients included: age, sex, reason for admission, primary and secondary diagnoses, daily Acute Physiology and Chronic Health Evaluation II (APACHE II) and Therapeutic Intervention Scoring System (TISS) scores, duration of ICU stay, place of residence, and employment status [22, 23]. Preadmission comorbidity was classified using the comorbidity index (CCI) developed by Charlson et al. [24]. To analyze the impact of preexisting chronic disease on changes in QOL the CCI was expressed as a three-level scale, corresponding to scores 0, 1–2, and 3 or higher [24]. Due to small numbers in some diagnostic categories the confirmatory analysis of impact of the diagnostic category on changes in QOL was analyzed only for groups containing at least 50 patients each.

At the 6-month follow-up interview the patient's domicile, employment status, recall of the ICU treatment ("How do you remember your stay on the ICU?" – no memories, positive memories, unpleasant memories, threatening memories), and the patient's attitude towards another future ICU treatment ("Are you willing to receive ICU treatment again, if necessary?") were recorded.

QOL instrument

Our aim was to assess health-related QOL, including both physical and psychosocial function, together with factors closely related to health, such as place of residence and employment status [25]. We used a QOL questionnaire designed specifically to assess health-related QOL in critically ill patients. The questionnaire proved workable in an ICU setting, and its validity, reproducibility, and discriminatory power were tested for longitudinal studies in such patients [26]. Fifteen items are grouped in three domains: Basic physiological activities (four items: urination and defecation control, oral communication, intake of food, 0–9 points), normal daily

Table 2 Primary diagnostic category of study patients

			6 month follow-up[a]			
	ICU admission ($n = 325$)		Survivors ($n = 185$)		Nonsurvivors ($n = 139$)	
Category	*n*	%	*n*	%	*n*	%
Respiratory	82	25	32	17	50	36
Gastrointestinal	82	25	57	31	25	18
Cardiovascular	52	16	33	18	19	14
Intoxication	30[a]	9[a]	25	14	4	3
Sepsis	18	6	4	2	14	10
Metabolic	18	6	11	6	7	5
Renal	10	3	4	2	6	4
Neurological	8	2	4	2	4	3
Miscellaneous	25	8	15	8	10	7

[a] One patient lost to follow-up

activities (eight items: mobility, tolerance of effort, walking, dressing, major efforts, work activities, precision of movements, social relationships, 0–15 points), and emotional status (three items: state of mind, vitality, subjective well-being, 0–5 points). The higher the score, the worse was the QOL. The baseline questionnaire evaluated the situation of the patient during the 2 months prior to ICU admission. The follow-up questionnaire reflected the patient's current life situation. When the patient was unable to respond, the questionnaire was completed with the help of a close family member living in the same household with the patient. Friends, neighbors, or attending physicians were not used as proxies. On the basis of their initial overall QOL score the patients were classified into four QOL categories, which correspond to the classifications assigned by the Glasgow Outcome Scale [26]: level I (0–1 points): no limitations, level II (2–5 points): mild deterioration in QOL, level III (6–9 points): severe deterioration in QOL, Level IV (10 points or higher): major handicap, dependence on others. The original Spanish questionnaire was translated using a forward-backward method as previously described [27, 28].

Statistical methods

Survival rates were compared using the Cox model. QOL measurements at baseline were compared with QOL measurements at follow-up using the Wilcoxon test for dependent samples. Differences in QOL measurements between more than two groups were compared by analysis of variance using Tukey's method of pairwise comparison. Analysis of changes in QOL on the basis of demographic and clinical variables were adjusted for the baseline QOL by multiple regression analysis. The level of significance was 0.05 (two-tailed) for all statistical tests. Statistical analysis was performed using SPSS for Windows 6.1.3.

Results

Quality of life measures

A baseline QOL was obtained from 325 patients, and 185 questionnaires were completed at the 6-month follow-up. There were 114 (62 %) pairs of interviews completed by the patient and 71 (38 %) with the help of a family member. At 6 months 139 patients had died and one patient was lost to follow-up. At baseline nonsurvivors had significantly ($p < 0.0005$) worse overall and subscale QOL scores than survivors (Table 1). At follow-up no significant decrease in the overall QOL score (6.4 ± 5.5 vs. 6.8 ± 6.9 at follow-up, $p = 0.93$) was noted, and a nonsignificant deterioration was seen in the subscales physiological basic activities (0.9 ± 1.4 vs. 1.1 ± 1.9, $p = 0.07$) and normal daily activities (3.7 ± 3.7 vs. 4.2 ± 4.3, $p = 0.15$), the subscale of emotional state showed a significant improvement (1.8 ± 1.6 vs. 1.5 ± 1.6, $p = 0.013$). Table 3 shows changes in the scores for the various QOL domains. When proxy responses were omitted, the results of overall and subscale QOL changes were not significantly different.

Patients with an unimpaired QOL on admission (level I) showed a significant deterioration at follow-up, and they were the only group showing a change in QOL category (level II). In contrast, patients with major handicaps initially (level IV) experienced a small but significant improvement (Table 4). Changes in QOL were correlated significantly with preadmission baseline QOL ($r = 0.22$, $p = 0.003$). QOL at baseline was therefore included as an additional covariate in all analyses. Age over 60 years and higher levels of comorbidity were significantly ($p \leq 0.0002$) associated with poorer QOL scores at follow-up. Gender and primary diagnostic categories ($n > 50$) had no significant impact ($p > 0.2$) on QOL changes. Multiple linear regression analysis (multiple $R^2 = 0.46$) revealed that preadmission QOL ($p < 0.001$), age ($p = 0.002$), and APACHE II within the first 24 h ($p = 0.002$) were most strongly associated with follow-up QOL. Table 5 groups patients in terms of their level of comorbidity. As expected, a significant correlation ($p < 0.001$) between preexisting diseases and QOL impairment at baseline was noted. At follow-up patients with no chronic disease showed a slight but significant improvement in QOL, whereas in the groups of patients with one or more chronic disease a nonsignificant deterioration in QOL was observed.

One-half of the survivors had positive and 16 % unpleasant memories of their ICU stay, while 6 % considered it to have been threatening. In 28 % of cases the pa-

Table 3 Changes in domains of quality of life *(QOL)* 6 months after admission to a medical intensive care unit in comparison with the preadmission status ($n = 185$)

	Improved		No change		Worsened	
	n	%	*n*	%	*n*	%
Overall QOL score	89	48.1	24	13	72	38.9
Basic physiological activities	45	24.3	93	50.3	47	25.4
Normal daily activities	63	34.1	51	27.6	71	38.4
Emotional state	86	46.5	46	24.9	53	28.6

tient had no memory of the stay. Patients unable to recall their ICU stay were significantly older ($p = 0.008$), had higher APACHE II scores on admission and during the course of ICU treatment (both $p < 0.001$), spent significantly more time on mechanical ventilation ($p = 0.001$), and had a significantly lower QOL at follow-up ($p < 0.001$) than patients with some memory of their ICU stay. Most survivors (94%) would agree to undergo ICU treatment again should this become necessary. All but one of the previously employed patients ($n = 46$) were able to return full-time to their former work. At follow-up most patients (86%) were living at home with their families, 14 were living in a nursing home, and 12 were again in hospital.

Discussion

Patients admitted to our medical ICU had a high level of preexisting chronic disease. In terms of the CCI 75% had one or more chronic diseases on admission and were receiving regular medical treatment. Preadmission QOL was reduced in 80% of our patients, with one-half of them having severe impairments. Nonsurvivors had a greater burden of comorbidity and poorer preadmission QOL scores in all subscales. A finding that is matched by previous studies showing a predictive value of comorbidity and functional health status on short- and long-term outcome of ICU patients [3, 5, 19, 29, 30]. Subsequent survival of patients discharged from hospital was 91.7% at 6 months (99% expected survival in the general population adjusted for sex and age), which is comparable to the mortality rates reported in earlier follow-up studies [6, 7, 11].

Our study found that 6 months after admission to our medical ICU most survivors had regained their former health-related QOL. Variations in methods and QOL instruments used in different ICU populations make direct comparison with previous QOL studies difficult. Nevertheless, our results agree quite well with those of other studies. After ICU treatment most investigators describe a decrease in physical activity and functional capacity in about 30% of their patients [3, 7, 10, 12]. In our study patients with an unimpaired preadmission QOL experienced the most pronounced deterioration at follow-up (Table 4). This phenomenon has also been reported by Vazquez Mata et al. [18] and Ridley et al. [17] in their cohorts of medical-surgical ICU patients.

At follow-up (proxy interviews excluded) 54% of survivors with functional deterioration reported an unchanged or even improved perceived QOL. Previous studies [12, 21, 31] have shown that despite objective reductions in health status, perceived QOL and life satisfaction of ICU survivors do not deteriorate, thus emphasizing that life unattractive to an observer may be perfectly satisfactory to the person involved [32].

Preadmission QOL, age, and severity of illness had the greatest effect on QOL at follow-up. This is in accord with other studies of QOL in critically ill patients [7, 12, 18, 21, 31]. Few studies have taken account of chronic diseases [12, 21], and none has applied a "weighted" index of comorbidity. The encouraging finding that the subgroup of survivors with greatly reduced preadmission QOL showed significant improvement at follow-up (Table 4) is tempered by the fact that 64% of the original severely impaired group died before follow-up. To characterize the impact of the diagnosis much larger databases are needed [33].

Previous investigators analyzing the patient's place of residence after ICU treatment have found that 86–92% of patients live at home [6, 31], which is in accord with our own findings. Since only 46 of our patients (25%) were gainfully employed prior to their ICU admission (all but one returned to the former workplace), employment status is not a valid descriptor in our study group. Other studies reported a 60–75% return to work after intensive care [6, 15, 20]. Despite pronounced comorbidity and the demonstrated restrictions in functional health, the great majority of survivors (94.1%) would repeat ICU treatment should this be

Table 4 Levels of quality of life *(QOL)* scores on admission and after 6 months ($n = 185$). Increasing QOL score denotes worsening of quality of life

Number of patients	Level I (score 0–1) 32 (17%)	Level II (score 2–5), 64 (35%)	Level III (score 6–9) 47 (25%)	Level IV (score ≥10) 42 (23%)
QOL score on admission	0.53 ± 0.51	3.34 ± 1.21	7.36 ± 1.05	14.48 ± 4.93
QOL score at 6 months	3.25 ± 5.71	4.69 ± 4.64	6.79 ± 5.79	12.71 ± 8.15
Change in QOL score	+2.72 ± 5.68	+1.35 ± 4.44	–0.57 ± 5.71	–1.77 ± 5.82
p value	0.004	NS	NS	0.04

Table 5 Relationship between Charlson Comorbidity Index and quality of life *(QOL)* scores (*n* = 185). Higher levels of comorbidity correspond to a higher burden of comorbid disease; increasing QOL score denotes worsening of quality of life

	0	1–2	≥3
Number of patients (%)	48 (26)	80 (43)	57 (31)
QOL score on admission	4.3 ± 3.5	6.3 ± 5.9	8.3 ± 5.8
QOL score at 6 months	3.5 ± 4.2	7.2 ± 7.6	8.9 ± 6.8
Changes in QOL score	–0.8 ± 4.2	+0.9 ± 5.8	+0.6 ± 6
p value	0.03	NS	NS

necessary. Gopal et al. [14] found a similar percentage (91.2 %) in patients surviving multiple organ failure.

Of the survivors 22 % had unpleasant or threatening memories of their ICU treatment. Previous studies [34] revealed a considerable level of depression and anxiety in about 25 % of intensive care survivors, which severely impaired their QOL. This clearly demonstrates that the care afforded the critically ill must include some consideration of the psychological consequences of the patient's illness [35].

This study has a number of shortcomings, some of which are related to the methodology of QOL assessment. The QOL questionnaire that we used (from the Project for the Epidemiological Analysis of Critical Care Patients) has been validated in critically ill Spanish patients, but despite forward-backward translation no cross-cultural adaptation in Germany was undertaken [25]. The different modes of administration of the QOL questionnaire (personal and telephone interview), and the use of proxies for ICU patients not able to respond might have affected the instrument's ability to detect changes in QOL over time [25]. Furthermore, the changes in QOL score representing a relevant improvement or deterioration in the individual ICU survivor have not been fully defined. In common with previous investigators [9, 10, 12, 18], we have therefore reported all changes in QOL scores in comparison with baseline (Table 3).

In conclusion, the majority of survivors after medical ICU treatment have a QOL consistent with that measured prior to admission, and return to their homes and workplaces. Preadmission QOL, age, and severity of illness are the main factors affecting the postdischarge QOL of patients surviving a critical illness. Larger databases are needed to analyze diagnostic categories and the impact of the socioeconomic background. To gather such data and to render the results of different ICU settings comparable, a consensus-based instrument for evaluating health-related QOL in the critically ill population is needed.

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References

1. Consensus Conference organized by the ESICM and the SRLF (1994) Predicting outcome in ICU patients. Intensive Care Med 20: 390–397
2. Byrick RJ, Mindorff C, McKee L, Mudge B (1980) Cost-effectiveness of intensive care for respiratory failure patients. Crit Care Med 8: 332–337
3. Le Gall JR, Brun-Buisson C, Trunet P, Latournerie J, Chantereau S, Rapin M (1982) Influence of age, previous health status, and severity of illness on outcome from intensive care. Crit Care Med 10: 575–577
4. Chassin MR (1982) Costs and outcomes of medical intensive care. Med Care 20: 165–179
5. Parno JR, Teres D, Lemeshow S, Brown RB, Avrunin JS (1984) Two-year outcome of adult intensive care patients. Med Care 22: 167–176
6. Zaren B, Hedstrand U (1987) Quality of life among long-term survivors of intensive care. Crit Care Med 15: 743–747
7. Jacobs CJ, van der Vliet JA, van Roozendaal MT, van der Linden CJ (1988) Mortality and quality of life after intensive care for critical illness. Intensive Care Med 14: 217–220
8. Dragsted L, Qvist J (1989) Outcome from intensive care. III. A 5-year study of 1308 patients: activity levels. Eur J Anaesthesiol 6: 385–396
9. Ridley SA, Wallace PG (1990) Quality of life after intensive care. Anaesthesia 45: 808–813
10. Konopad E, Noseworthy TW, Johnston R, Shustack A, Grace M (1995) Quality of life measures before and one year after admission to an intensive care unit. Crit Care Med 23: 1653–1659
11. Tian ZM, Miranda DR (1995) Quality of life after intensive care with the sickness impact profile. Intensive Care Med 21: 422–428
12. Capuzzo M, Bianconi M, Contu P, Pavoni V, Gritti G (1996) Survival and quality of life after intensive care. Intensive Care Med 22: 947–953
13. Brooks R, Kerridge R, Hillman K, Bauman A, Daffurn K (1997) Quality of life outcomes after intensive care. Comparison with a community group. Intensive Care Med 23: 581–586
14. Gopal I, Bhonagiri S, Ronco C, Bellomo R (1997) Out of hospital outcome and quality of life in survivors of combined acute multiple organ and renal failure treated with continuous venovenous hemofiltration/hemodiafiltration. Intensive Care Med 23: 766–772
15. Hurel D, Loirat P, Saulnier F, Nicolas F, Brivet F (1997) Quality of life 6 months after intensive care: results of a prospective multicenter study using a generic health status scale and a satisfaction scale. Intensive Care Med 23: 331–337
16. Vazquez Mata G, Rivera Fernandez R, Perez Aragon A, Gonzalez Carmona A, Fernandez Mondejar E, Navarrete Navarro P (1996) Analysis of quality of life in polytraumatized patients two years after discharge from an intensive care unit. J Trauma 41: 326–332

17. Ridley SA, Chrispin PS, Scotton H, Rogers J, Lloyd D (1997) Changes in quality of life after intensive care: comparison with normal data. Anaesthesia 52: 195–202
18. Vazquez Mata G, Rivera Fernandez R, Gonzalez Carmona A, Delgado-Rodriguez M, Torres Ruiz JM, Raya Pugnaire A, Aguayo de Hoyos E (1992) Factors related to quality of life 12 months after discharge from an intensive care unit. Crit Care Med 20: 1257–1562
19. Campion EW, Mulley AG, Goldstein RL, Barnett GO, Thibault GE (1981) Medical intensive care for the elderly. A study of current use, costs, and outcomes. JAMA 246: 2052–2056
20. Goldstein RL, Campion EW, Thibault GE, Mulley AG, Skinner E (1986) Functional outcomes following medical intensive care. Crit Care Med 14: 783–788
21. Patrick DL, Danis M, Southerland LI, Hong G (1988) Quality of life following intensive care. J Gen Intern Med 3: 218–223
22. Keene AR, Cullen DJ (1983) Therapeutic Intervention Scoring System: update 1983. Crit Care Med 11: 1–3
23. Knaus WA, Draper EA, Wagner DP, Zimmerman JE (1985) APACHE II: a severity of disease classification system. Crit Care Med 13: 818–829
24. Charlson ME, Pompei P, Ales KL, MacKenzie CR (1987) A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis 40: 373–383
25. Guyatt GH, Feeny DH, Patrick DL (1993) Measuring health-related quality of life. Ann Intern Med 118: 622–629
26. Fernandez RR, Cruz JJ, Mata GV (1996) Validation of a quality of life questionnaire for critically ill patients. Intensive Care Med 22: 1034–1042
27. Bullinger M (1995) German translation and psychometric testing of the SF-36 Health Survey: preliminary results from the IQOLA Project. International Quality of Life Assessment. Soc Sci Med 41: 1359–1366
28. Aaronson NK, Acquadro C, Alonso J, Apolone G, Bucquet D, Bullinger M, Bungay K, Fukuhara S, Gandek B, Keller S, et al (1992) International Quality of Life Assessment (IQOLA) Project. Qual Life Res 1: 349–351
29. Pompei P, Charlson ME, Ales K, MacKenzie CR, Norton M (1991) Relating patient characteristics at the time of admission to outcomes of hospitalization. J Clin Epidemiol 44: 1063–1069
30. Mayer-Oakes SA, Oye RK, Leake B (1991) Predictors of mortality in older patients following medical intensive care: the importance of functional status. J Am Geriatr Soc 39: 862–868
31. Yinnon A, Zimran A, Hershko C (1989) Quality of life and survival following intensive medical care. Q J Med 71: 347–357
32. Guyatt GH, Cook DJ (1994) Health status, quality of life, and the individual. JAMA 272: 630–631
33. Niskanen M, Kari A, Halonen P (1996) Five-year survival after intensive care-comparison of 12,180 patients with the general population. Finnish ICU Study Group. Crit Care Med 24: 1962–1967
34. Griffiths RD, Jones C (1999) Recovery from intensive care. BMJ 319: 427–429
35. Lloyd GG (1993) Psychological problems and the intensive care unit. BMJ 307: 458–459