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Social integration – an important factor for health related quality of life after critical illness

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Abstract (Abstract length words 200)

Objectives: To examine to what extent availability of social integration affect health related quality of life (HRQoL) in former Intensive Care Unit (ICU) patients and how it relates to corresponding findings in a general reference group.

Design: Controlled, multicenter, prospective, explorative study.

Setting and Patients: HRQoL data (SF-36) was collected from three combined medical and surgical intensive care units in the southeast of Sweden. Social integration was assessed by the Availability of Social Integration (AVSI) instrument (7 questions related to the social interaction of the patient). As reference group, a random sample (n=6093) of people from the uptake area of the hospitals were used. Social integration (AVSI), HRQoL (SF-36), and comorbidity was examined also in the reference group.

Interventions: None.

Measurements and results: The level of social integration significantly affected HRQoL for the former ICU patients whereas no such effect was seen for the general reference group. For the ICU patients' social integration affected HRQoL to a larger extent than age, sex and the ICU related factors examined, but to a lower extent than the pre-existing diseases.

Conclusions: For a comprehensive assessment of HRQoL in former ICU patients it is mandatory to include the effect of social integration. .

Key words; Availability of social integration (AVSI), Health related quality of life, Comorbidity, Intensive care, Follow-up

Introduction (Paper length words 3013)

Health related quality of life (HRQoL) is one and possibly the most important follow-up measure that is used to assess outcome after critical care [1, 2]. A decreased HRQoL has repeatedly been shown for former ICU patients both short and long term after critical care and compared with a general population [3-5]. Focus in such studies has been directed at factors believed to be important for this outcome. The most commonly stressed are age, sex, duration of stay on the ICU, Acute Physiology and Chronic Health Evaluation (APACHE) II score and time on ventilator [1]. Also, it has recently been claimed that pre-existing disease is more important than the others listed and in a magnitude comparable to these factors taken together [6]. This finding was made when a large control population was used and adjusted for co-morbidities. In that study approximately 50 % of the decrease in HRQoL was ascribed to co-morbidities together with the other factors (age, sex, duration of stay on the ICU, APACHE II score and time on ventilator).

It may then be concluded that yet more factors must contribute to the HRQoL situation for these patients. In HRQoL research outside the field of critical care it has been shown that factors such as social integration, coping and socio-economic factors (marital state, education, immigrants) also may be important for the HRQoL experience [7-9].

The concept of availability of social integration (AVSI) was primarily used in the mid seventies by the emergence of a new field of scientific research, and initially used in the mental health literature [10] . From this research the role of social relationships especially integration were emphasized to buffer negative health effects and furthermore that social integration maintains or sustains the organism by promoting adaptive behaviour of neuro endocrine responses in the face of stress or other health hazards. Risk factors of importance

for the lack of social integration and health includes: younger age and older female sex, lower occupational grade, less years of education, lower social class, immigrant, more symptoms of ill health, smoking, and more frequent use of alcohol [11, 12]. More socially isolated or less socially integrated individuals are less healthy, both psychologically and physically, and are more likely to die [7, 13]. Research has indicated that psychosocial counselling during and after stressful procedures, such as critical care, can decrease the associated level of stress and improve the recovery process [14, 15]. Recently this has become a focus of research interest during intensive care [16, 17] however, it is not widely used for this purpose after the period of intensive care and discharge from the hospital.

The aim of this study was to examine to what extent social integration patterns affects HRQoL outcome in the 6 months follow-up of critically ill patients, and to examine if the effect differ between that found for the ICU patients and the general population.

Materials and methods

Design

This prospective, multicenter study took place in three mixed medical-surgical ICUs, one university and two general hospitals, in south-east Sweden, that have a regional referral area covering roughly one million people.

Patients with primary coronary disease, those recovering after heart surgery and neurosurgery, neonates, or patients with burns are treated in other specialised units, and were excluded from this study. The ICUs admit 500 - 750 patients annually and nearly all admissions are emergencies. The most common primary diagnoses are multiple trauma, sepsis, and disturbances in respiratory or circulatory systems.

Participants

This study is part of a large study previously published [6, 18]. In short: all patients aged 18 years and older, who were consecutively admitted to the intensive care units between 2000 and 2004, remained in the ICU for more than 24 hours, were alive six months after discharge from hospital, and consented to participate in the study were included. Patients who were readmitted were included only on their first admission. After the national Swedish Social Security register had been checked to avoid sending inquiries to patients who had died, we sent information and a request to participate to each patient by mail, together with a structured questionnaire and a preaddressed and prepaid envelope. The information included that the study was voluntary, could be terminated, and the importance of that the questionnaire should be answered by the patient only. Patients who had not responded within about 10 days were contacted by telephone by one of the investigators (LO, ES or CB), which was predetermined. If telephone or first mailing achieved no answer two reminders were sent out (at 3 and 6 weeks). The clinical databases in each hospital were used to extract patient data.

Data from a public health survey of the county of Östergötland were used for comparison of availability of social integration, HRQoL and comorbidity. This reference group consisted of a random sample of the general population living in the uptake area of the hospitals. That survey was approached for the purpose of monitoring the general health of this population in a different study and was completed during 1999 [12].

The study was approved by the Committee for Ethical Research at the University of Health in Linköping.

Questionnaires and Instruments

A set of structured questionnaires were mailed to the study population 6 months after discharge from hospital. The questionnaire contained questions about the patients'

background (civil state, children living at home, born in Sweden or not, education, employment before and after admission to the ICU, sick leave before and 6 months after discharge from the ICU and hospital, and preexisting disease (self-reported diagnosis). The questionnaire asked, “Have you had any significant illness, reduced body function or other medical problem and have had it for more than 6 months prior to the ICU period” with the answer alternative “yes” or “no”. Further, this question also had the pre-specified illnesses alternatives: “cancer, diabetes, heart failure, asthma/allergy, rheumatic-gastrointestinal-, blood-, kidney-, psychiatric-, neurological disease, thyroid or any other metabolic disturbance, or any other long term illness”. The last alternative was an open question with a slot for free text.

AVailability of Social Integration (AVSI)

The instrument Availability of Social Integration (AVSI) [19] was used to assess social integration patterns. AVSI was developed in the beginning of the eighties and has been validated and found reliable (internal consistency 0.71; test re-test 0.75; stability of scores over time (0.84-0.87 (range 4-12 months))) [19] and used repeatedly in examinations of social structure in patient populations [20-22] Furthermore one of these studies (22) involves the reference group also used in the present study. This instrument is one of four subscales in the extensive instrument The Interview Schedule for Social Interaction (ISSI) [19]. AVSI has been translated into Swedish and has then been found a reliable instrument as well [11]. In the Swedish setting it has been used in epidemiological research [12]. It comprises of 7 questions. (listed in appendix A). In 6 of them the respondent state how many persons they have supply from, for example “These days, how many people with similar interests to you do you have contact with?” with six answer alternatives ranging from No-one to more than 15.

One question has the answer alternative Yes or No: “Irrespective of those at home, do you have someone you can turn to if you are in trouble? Someone that you easily can meet and that you trust upon and that really can help you when you have hard times?” The questions generates a summation score index to a scale ranging from 6 (the worst score) to 36 (best score).

Health Related Quality of Life

The Medical Outcome Short Form 36 (SF-36) was chosen for the evaluation of HRQoL [23, 24]. The instrument is internationally well known and has often been used [25]. SF-36 has previously been applied in intensive care [6, 26-28], and has recently been recommended as one of the best-suited instrument for measuring HRQoL in trials in critical care [29].

SF-36 has been translated into Swedish and validated in a representative sample [30]. It has 36 questions and generates a health profile of eight sub-scale scores [24, 30]. These 8 scores were aggregated to form two commonly used summary measures: the physical component summary score (PCS) and the mental component summary score (MCS).

Statistics

Data are presented descriptively (mean, 95% confidence intervals) using parametric statistics (one-way analysis of variance) and non-parametric statistics (Pearson’s chi square test).

Linear regression analysis, adjusted for sex and age, was used to evaluate the independent effects of APACHE II scores on admission, length of stays in ICU and hospital, diagnoses on admission, time on ventilator, marital state, level of education, born in Sweden or not, age, sex, social support, and pre-existing disease, on HRQoL (component summary score) among the patients. Only standard statistical methods are used [31]. Further, when ICU survivors were compared with the reference group, survivors older than 74 years were excluded since the reference population did not include subjects older than 74 years.

The statistical package for the Social Sciences (SPSS, version 17.0, Chicago, IL. USA) was used for the statistical analyses. Probabilities of <0.05 were accepted as significant.

Results

Clinical and Sociodemographic Characteristics of the patients

During the study period 5306 patients were admitted to the ICUs. Of these a total of 1663 (31%) patients met the inclusion criteria. After two reminders, 980 patients (59 %) answered the questionnaire (Figure 1).

The group who did not respond at all in the study ($n=683$ (41%)) differed from the group who responded in that there were fewer men ($p=0.02$), higher average APACHE II score ($p=0.04$), shorter length of stay in the ICU ($p<0.0001$), shorter time on ventilator ($p<0.0001$), and fewer gastrointestinal admission diagnoses ($p=0.02$) (Table 1).

For the reference group, questionnaires were initially sent out to 10, 000 people. After two reminders, 6093 (61%) had responded [12]. Apart from lower percentages of immigrants and single households, the responders in the reference group differed only marginally from the reference population of the county [12]. The reference group were younger ($p<0.001$), had a higher rate of women ($p<0.001$), higher rate of married/cohabit ($p<0.001$), and employed ($p<0.001$), and had a lower rate of comorbidity (51 %) ($p<0.001$) than the ICU group, after adjusting for age in the ICU group (age <74 years) ($n=780$ (80%)) (Table 2).

Availability of social integration

The former ICU patients reported significant lower mean score in availability of social integration than the reference group, 19.8 (SD 6.3) compared with 20.7 (SD 5.8) ($p<0.001$).

In Table 3 the comparison between the individuals with or without comorbidity in each study

group are shown. The ICU patients with preexisting diseases reported significant lower mean scores in availability of social integration compared with the ICU patients who were healthy before the intensive care period. For the reference group there were no differences in availability of social integration between the individuals with comorbidity or not. Significant differences in availability of social integration were also seen between the ICU patients with pre-existing diseases compared with the reference group with comorbidity. Between the healthy former ICU patients and the healthy reference group there were no differences in availability of social integration (Table 3).

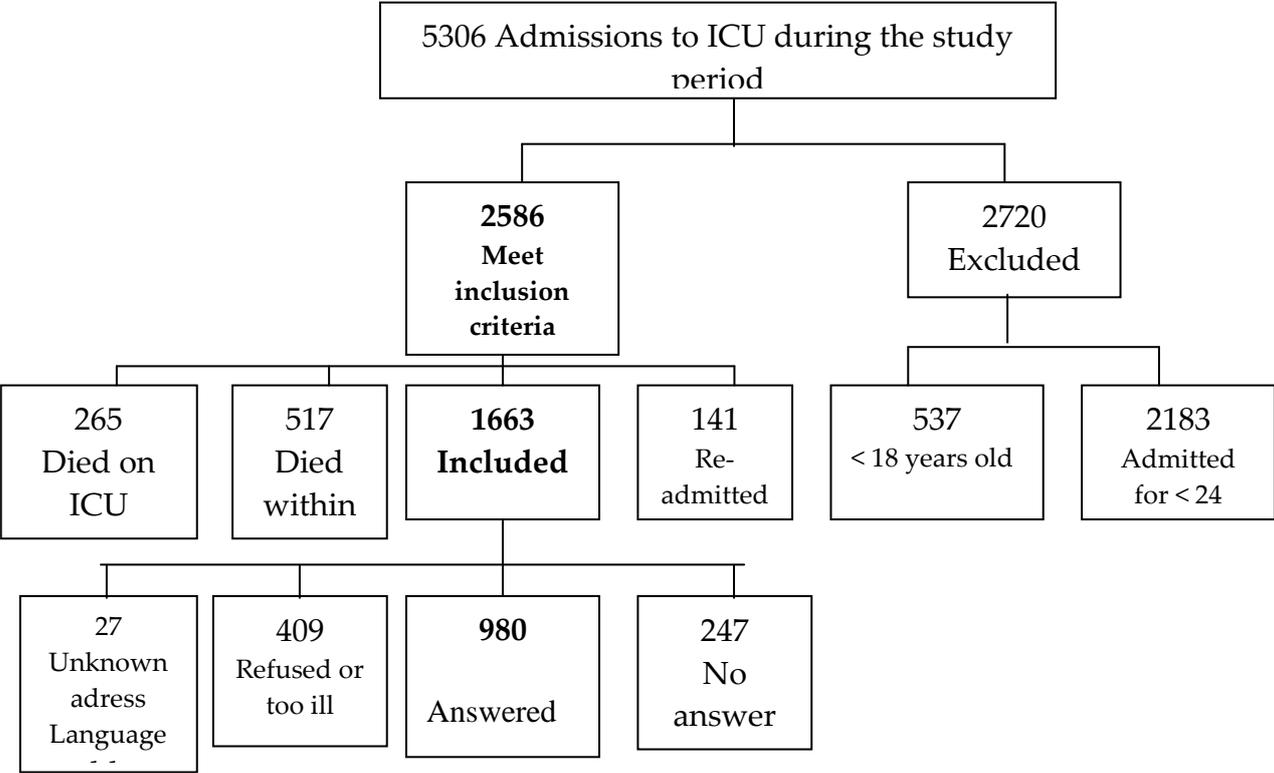


Figure 1. Outline of the study protocol.

Health Related Quality of Life

The reference group scored significantly higher HRQoL than the ICU patients in all eight dimensions of the SF-36 ($p < 0.001$), and the summary component scores with mean score differences between 6.9 (mental health) to 34.8 (physical role functioning).

The PCS summary component score mean was 39.1 (SD 12.7) for the ICU patient group, and 50.0 (SD 9.6) for the reference group ($p < 0.001$). The MCS summary component score was 45.0 (SD 13.4) for the ICU patient group and 49.0 (SD 10.6) for the reference group ($p < 0.001$). The summary component scores were used in a multiple linear regression analysis, to evaluate the effect of availability of social integration (AVSI score), APACHE II score at admission to the ICU, length of stay in ICU and in hospital, diagnoses on admission to the ICU, time on ventilator, marital status, education, born in Sweden or not, gender, age, and pre-existing disease (Table 4). The results demonstrate that availability of social integration significantly affected HRQoL both physically and mentally to a greater extent than age, sex, years of education, marital state, or immigrant, but lower than pre-existing diseases. Further availability of social integration significantly affected HRQoL to a greater extent than ICU related factors; APACHE II score, length of stay in ICU, or time spent on ventilator. Of the ICU related factors examined only the ICU admission diagnoses affected HRQoL more than the availability of social integration.

ICU patients with lower mean availability of social integration scores, and younger age had decreased physical and mental component scores. The magnitude of this effect was less compared with the effects of pre-existing diseases. Longer duration of stay in the hospital was associated with decreased physical component score, and being single/widow/widower was associated with decreased mental component score (Table 4).

Discussion

The new and important finding of this study is that availability of social integration patterns affects HRQoL for former ICU patients and this effect, albeit smaller than that of pre-existing diseases, needs to be acknowledged in studies trying to comprehensively picture HRQoL in former ICU patients.

The cohort used in this study is a part of a large study that has previously been examined from several different perspectives [6, 18, 26] . Health related quality of life has been examined short and long term. In these investigations the cohort was found to be comparable to other general ICU follow-up studies in Scandinavia and in northern Europe. Also the background characteristics (APACHE II, LoS, diagnoses) are similar in comparison [3, 27, 32]. It may therefore be assumed that the findings presented in this study regarding the effects of social support are valid also for other units in this part of the world.

Although, in the present study, the APACHE II scores were higher in the non-responders group, LoS in ICU and time on ventilator were increased in the study group. This suggests that the study group comprises patients with relevant ICU related illnesses.

Very interestingly, when comparing the availability of social integration value of the present ICU groups with a control population from the uptake areas of the ICU units it is evident that the ICU population has a significantly decreased (approximately 10%), AVSI score. As anticipated we found a significant effect on AVSI score by age but not sex [7]. It needs then to be appreciated that a significant, and most probably the largest effect on the AVSI score for this patient group, is the effect of pre-existing disease. This was also evident as an interaction in the statistical analysis. Despite this, a significant effect of AVSI score on HRQoL remained after controlling for the effect of pre-existing disease and age. This finding suggests that

AVSI score has an effect on HRQoL beyond what is registered due to effects of pre-existing disease. This stresses that AVSI score is important when a comprehensive HRQoL examination is being done on former ICU patients or any other population. Furthermore, of the socio-economic factors examined only marital state (living alone) was found to have an effect on HRQoL, and this effect was small.

There are a number of factors that may affect the conclusions of this study. Firstly the number of patients studied, although done in a low populated area of Sweden, 980 patients were recruited to this study, which makes it a very large study in this field of research.

Secondly, Sweden is from a social perspective a homogenous country [12]. This leads to the fact that variations in AVSI scores in populations examined are rather small as was experienced also in this study [11, 12]. The relevance of the present findings may then be larger in countries with larger social differences where adjustments of the effects of social network on the outcome of HRQoL may be more important [33].

Thirdly, another confounding factor is that it is difficult to examine the effects of socio-economic factors in this rather homogenous population. However, although we did not have specific income data other often examined socio-economic variables, i.e., marital status, education, employment, immigrants and sick leave were examined and adjusted for.

Fourth, and very importantly, when examining effects of the availability of social integration patterns there is yet no consensus to what measure to use [34, 35]. This makes it difficult to compare the outcomes of different studies. For example the AVSI score instrument used in the present study is a quantitative measure of the social integration. It does not assess the quality of the social relationships and the corresponding support provided. However, those assessing quantitative aspects of social integration have claimed this approach more readily applicable, and the questions are more easily and quickly understood and answered. They

have also found that the data predicts physical illness in prospective studies. Their psychometric properties, however, are unknown [36].

Fifth, a complicating fact is that many factors of the population studied are known to affect AVSI score and possibly the opposite applies as well. That is, pre-existing disease, age, sex, marital state all known to be important for the social integration pattern [11, 12]. It is difficult then to know which effect that is cause-effect related as all these are known to affect social integration but at the same time several of them have strong effects on HRQoL. We believe however that when adjusting for such effects by multiple regression techniques the conclusions are still valid.

Lastly, a limitation of the present study is the response rate of 59%, which on one hand is an acceptable rate for postal questionnaires, but on the other hand there is a risk that the non-responders could include more individuals with lower social integration. The latter is at least in theory plausible.

Conclusions

The novel finding in this study is that the social integration patterns among former ICU patients were found to affect HRQoL and therefore it needs to be examined in parallel when comprehensive studies on HRQoL in these populations are undertaken. Furthermore, this effect is larger than any of the ICU related factors but less than of pre-existing diseases.

Table 1 Clinical characteristics on admission of the patients in the study group and the non responders group

	Study group (n=980)	Non- responders (n=683)	p-value †
Male/female	567/413 (58)	357/326 (52)	0.02
Age (years)	58.2 (18.2)	57.7 (19.6)	0.54
APACHE II score	15.6 (7.7)	16.3 (7.6)	0.04
Stay in ICU (hours)	123.1 (167.8)	93.1 (105.5)	<0.001
Stay in hospital (days)	15.0 (19.6)	14.8 (19.9)	0.85
Time on ventilator (hours)	62.0 (154.2)	33.5 (81.6)	<0.001
Diagnosis on admission to ICU			0.02
Multiple trauma	117 (12)	69 (10)	
Sepsis	82 (8)	53 (8)	
Gastrointestinal disease	204 (21)	104 (15)	
Respiratory disease	196 (20)	147 (22)	
Miscellaneous	381 (39)	309 (45)	
Pre-existing diseases	725 (74)		
Cancer	116 (16)		
Diabetes	131 (13)		
Cardiovascular	203 (28)		
Gastrointestinal	122 (17)		
Miscellaneous	628 (64)		
No. of diseases			
0	256 (26.1)		
1	418 (42.7)		
2	190 (19.4)		
≥3	116 (11.8)		

† between groups answered at 6 month and non-responders

APACHE II; Acute Physiology and Chronic Health Evaluation, ICU; Intensive Care Unit

Data are number (%) or mean (SD)

Table 2 Sociodemographic characteristics of patients in the study group <74 years and the reference group

Characteristic	ICU group (n=780)	Reference group (n=6093)	p-value
Male gender	444 (57)	2822 (46)	<0.001
Age, yrs	52.5 (15.8)	46.4 (15.1)	<0.001
Education			0.060
Basic school	273 (35)	1757 (29)	
High school/university	187 (24)	1350 (23)	
Marital state			<0.001
Single	231 (30)	1312 (22)	
Married/cohabit	496 (64)	4114 (74)	
Widow/widower	42 (6)	275 (5)	
Children at home	172 (22)	2316 (39)	<0.001
Employment <i>before ICU</i>			<0.001
Employed/leader	367 (50)	3538 (59)	
Retired	297 (40)	1132 (19)	
Student	27 (4)	396 (7)	
Other ‡	51 (7)	945 (16)	
<i>6 months after ICU</i>			
Employed	293 (41)		
Retired	330 (47)		
Student	25 (4)		
Other	60 (8)		
Sick leave <i>before ICU</i>	109 (14)	75 (1)	<0.001
Reported sick 100%	71 (65)	64 (85)	
Reported sick <100%	25 (35)	11 (15)	
<i>6 months after ICU</i>	196 (25)		
Reported sick 100%	153 (78)		
Reported sick <100%	31 (22)		
Pre-existing diseases	568 (73)	3095 (51)	<0.001
Cancer	86 (15)	32 (0.5)	
Diabetes	102 (18)	95 (2)	
Cardiovascular	131 (23)	810 (13)	
Gastrointestinal	89 (16)	306 (5)	
Miscellaneous	503 (88)	1968 (32)	
No. of diseases			
0	212 (28)	2998 (49)	
1	346 (44)	1919 (32)	
2	135 (17)	604 (10)	
≥3	89 (11)	572 (9)	

Not all patients answered all questions
Data are number (%) or mean (SD)

Table 3 Comparison of social support (mean score) between ICU patients ≤ 74 years and the general population with or without comorbidity

Social support	ICU-patient	Reference group	p-value ‡
With comorbidity	19.3 (SD 6.4)	20.6 (SD 5.7)	0.020
Healthy	21.0 (SD 6.0)	20.7 (SD 5.8)	0.416
p-value †	0.001	0.507	
95% CI	-2.61 to -0.68	-0.39 to 0.19	

Social support summa index score from 6 (worst score) to 36 (best score)

† between healthy and not healthy in each group

‡ between ICU patients and the general population with or without comorbidity

Table 4 SF-36 summa score multiple regression analyse, (linear) final model (95% Confidence Interval for B) (n=980)

Source	PCS p-value	B	MCS p-value	B
APACHE II score	0.32	0.05 (-0.05 to 0.16)	0.80	0.02 (-0.72 to 0.52)
LoS ICU	0.012	-0.006 (-0.01 to -0.001)	0.93	0.001 (-0.009 to 0.01)
LoS hospital	0.011	-0.05 (-0.09 to -0.01)	0.67	-0.01 (-0.05 to 0.03)
Diagnos	<0.001	1.10 (0.58 to 1.63)	0.77	-0.09 (-0.71 to 0.52)
Time on ventilator	0.65	0.002 (-0.01 to 0.01)	0.16	0.004 (-0.002 to 0.01)
Marital state (living alone)	0.82	0.18 (-1.35 to 1.70)	0.003	-1.89 (-3.13 to -0.64)
Education				
Basic school	0.61	0.43 (-1.22 to 2.08)	0.14	1.32 (-0.42 to 3.05)
High school/university	0.45	0.67 (-1.06 to 2.40)	0.47	-0.80 (-2.98 to 1.37)
Born i Sweden	0.58	0.74 (1.90 to -3.39)	0.41	1.27 (-1.74 to 4.28)
Sex (male)	0.32	0.74 (-0.72 to 2.20)	0.56	0.51 (-1.18 to 2.19)
Age	<0.001	-0.17 (-0.22 to -0.13)	<0.001	0.11 (0.07 to 0.16)
AVSI	<0.001	0.26 (0.14 to 0.38)	<0.001	0.59 (0.46 to 0.73)
Pre-existing disease	<0.001	-9.3 (-10.94 to -7.68)	<0.001	-5.76 (-7.62 to -3.89)

Adjusted for age and sex, B value are unstandardized

PCS; Physical component summary score, MCS; Mental component summary score, SF-36; Short form 36, APACHE; Acute physiological and chronic health evaluation, LoS; Lenght of stay, AVSI; Availability of social integration

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