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Application of the Italian version of the Intensive Care Unit Memory tool in the clinical setting

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Abstract

Introduction The aims of the present study were to assess patients' memories of their stay in the intensive care unit (ICU) over time, using the Italian version of the ICU Memory (ICUM) tool, and to examine the relationship between memory and duration of ICU stay and infection.

Patients and method Adult patients consecutively admitted to a four-bed ICU of a university hospital, whose stay in the ICU was at least 3 days, were prospectively studied. The ICUM tool was administered twice: face to face 1 week after ICU discharge to 93 patients (successfully in 87); and by phone after 3 months to 67 patients. Stability of memories over time was analyzed using Kappa statistics.

Results Delusional memories appeared to be the most persistent recollections over time (minimum κ value = 0.68), followed by feelings (κ value > 0.7 in three out of six memories) and factual memories (κ value > 0.7 in three out of 11 memories). The patients without a clear memory of their stay in the ICU reported a greater number of delusional memories than did those with a clear memory. Of patients without infection 35% had one or two delusional memories, and 60% of patients with infection had one to four delusional memories ($P = 0.029$).

Conclusion The ICUM tool is of value in a setting and language different from those in which it was created and used. Delusional memories are the most stable recollections, and are frequently associated both with lack of clear memory of ICU experience and with presence of infection during ICU stay.

Keywords critical care, intensive care, memory, mental recall

Introduction

Patients' memories of intensive care have been investigated in patients admitted to general [1–4] and medical [5] intensive care units (ICUs), especially in relation to artificial ventilation [1,6] and sedation [7–9]. However, the way in which the various studies investigated recollections was not consistent, making comparisons difficult and unclear or even impossible. Therefore, a new and specific instrument with which to assess patients' memories of their ICU stay (ICU Memory [ICUM] tool) was developed and validated by Jones and coworkers [10] in the UK. In a subsequent study the same authors, using the ICUM in 45 patients who were ventilated

APACHE = Acute Physiology and Chronic Health Evaluation; ICU = intensive care unit; ICUM = Intensive Care Unit Memory (tool); SAPS = Simplified Acute Physiology Score.

and stayed in the ICU for at least 24 hours, demonstrated the impact of memories on development of psychological morbidity after discharge from the ICU [11].

If one is to use an instrument in different countries, in order to compare research data, then it is necessary not only to translate it [12] but also to validate it. However, a formal psychometric approach in the validation of this type of questionnaire could be misleading because of the lack of clearly related domains or dimensions. Therefore, the ICUM tool should be viewed as an instrument that can classify patients' memories of their ICU stay, and therefore allows relationships between memories and clinical information to be identified.

The aims of the present study were to assess patients' memories of their stay in the ICU, using the Italian version of the ICUM tool, over time, and to examine the relationship between memory and duration of ICU stay and infection.

Patients and method

The study was conducted in a four-bed mixed (surgical and medical) ICU in a 904-bed university hospital. At the time of study, there were 24 additional adult ICU beds in the hospital. The ICU in which the study was performed serves thoracic, vascular and high-risk abdominal surgery patients and medical ward patients of the hospital.

All patients (aged >18 years) consecutively admitted in 2000, who stayed in the ICU for at least 3 days and were discharged alive from the ICU, were eligible. The local ethics committee approved the study, and informed consent was obtained from all patients.

During the period of study, 235 patients were admitted to the ICU. Of those, 95 stayed in the ICU for less than 3 calendar days and 19 died in the ICU. Of the remaining 121 patients discharged alive from the ICU, 15 died in hospital before the interview. Three patients, who had a short ICU stay but were readmitted to the ICU for longer than 3 days, were included at the time of second ICU discharge. Therefore, 109 patients were eligible for inclusion in the study.

For each patient the following data were recorded at ICU admission: type of ICU admission (scheduled or emergent), Acute Physiology and Chronic Health Evaluation (APACHE) II score [13] and Simplified Acute Physiology Score (SAPS) II [14]. In addition, past medical history was recorded, including smoking, use of alcohol and sedatives, and arterial hypertension (defined as a history of systolic blood pressure ≥160 mmHg and/or diastolic blood pressure ≥95 mmHg, treated or untreated). Also recorded were clinical variables during the ICU stay, including reason for ICU admission, presence of infection or sepsis, maximal body temperature (°C) during ICU stay, duration of mechanical ventilation, and administration of corticosteroids, analgesic and sedative drugs. Morphine was considered an analgesic; propofol, benzodiazepines and neuroleptics (haloperidol and promazine) were considered sedative drugs.

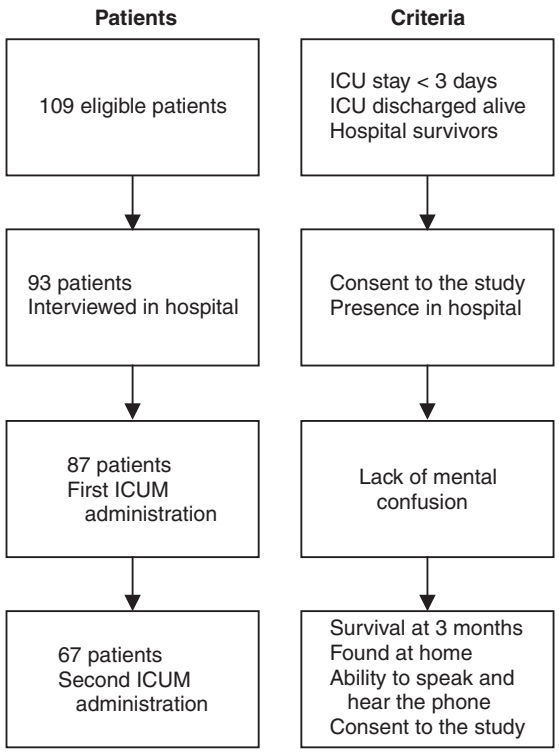
At ICU discharge the physician informed the patient about the study. For each patient who gave informed consent, before hospital discharge, usually 1 week after ICU discharge, the physician participating in the study went to the ward to which the patient had been transferred and administered the ICUM tool (first interview) [10]. Three months later, the ICUM tool was administered again, by phone and by the same physician who administered the questionnaire the first time (second interview). Face-to-face administration of the questionnaire was chosen for the first interview to increase the response rate, whereas telephone administration was chosen for the second interview so that patients did not need to come back to the hospital. In comparison with self-administered, mailed questionnaires, face-to-face and telephone interviews prevent misunderstanding and items from being missed [15].

Of the 109 patients eligible for the study, three did not give consent for the study and 13 were discharged from the hospital before administration of the questionnaire. Therefore, 93 first interviews (i.e. during the hospital stay) were performed. At the first interview, six out of 93 patients were confused and unable to answer. Therefore, first interview data from 87 patients were evaluable. Twenty of those patients who underwent the first interview were not interviewed at 3 months: four patients died during the interval between interviews; five were lost to follow-up; three were hospitalized elsewhere; three patients were terminally ill or too sick to be interviewed; three could not hear sufficiently well to undergo the telephone interview; and two refused to participate further in the study. Therefore, the second interview was administered to 67 patients. A flow diagram of patient enrolment and questionnaire administration is presented in Fig. 1.

The ICUM tool [10] consists of items that investigate the patient's recollections before ICU admission and while they are in the ICU. It also includes two items to determine whether post-traumatic stress disorder related symptoms are present. The items included in the ICUM tool are summarized in Table 1.

The ICUM tool [10] was translated and back-translated in Italian by bilingual researchers, namely native Italian-speaking medical doctors who can also speak English, and native English-speaking teachers who can also speak Italian. There were two meetings with the translators. In the first, the Italian translation of the ICUM tool was back-translated into English and compared with the original version by critically examining, item by item, the linguistic accuracy; the Italian version was then modified accordingly. The new Italian version was then independently back-translated by a second native English-speaking teacher and again compared with the original version to arrive at the final version of the instrument, which

Figure 1



Flow diagram of patient enrolment and questionnaire administration. ICU, intensive care unit; ICUM, Intensive Care Memory (tool).

was used in the study (see Appendix 1). (Note that the original, English language version of the instrument is available in full in the report by Jones and coworkers [10].)

Analysis of the Intensive Care Unit Memory questionnaire

To examine the extent to which individual items in a domain appear to measure the same underlying attribute, the internal consistency is usually analyzed using Cronbach's α coefficient [16]. Nevertheless, ICUM is not a true summed rating scale and involves multiple dimensions, which may not logically be added together to yield a total score. Also the single items of the ICUM devoted to assessment of factual events, feelings and delusional memories are not interrelated in such a way that they may be considered part of a single domain. Cronbach's α was therefore not considered.

The stability of memories over time was analyzed in the 67 patients who underwent two interviews. The minimum sample size corresponding to an α error of 0.01 and a power of 0.95, considering that a correlation coefficient greater than 0.60 was expected, is 41.

To test the value of the ICUM tool [15], the relationship between the presence of clear memories, as assessed using the ICUM tool, and duration of stay in the ICU was analyzed. A lengthy stay in the ICU indicates a serious and prolonged illness, which has been demonstrated to be associated with delirium in a high proportion of patients, even in a relatively young population [17]. In turn, delirium is a clinical condition that influences memory [18] and causes distressing recollections [19]. Thus, it was predicted that lack of a clear memory of ICU stay should correlate with a prolonged ICU stay. A second prediction was that patients with infection would have more delusional memories that those without, because infection is the most frequent cause of encephalopathy [20,21].

Statistical analysis

Data are expressed as mean ± standard deviation, unless indicated otherwise. Numerical variables with ordered categories and the severity scores SAPS II and APACHE II are described as median and interquartile range (25th and 75th percentiles). Statistical analyses were conducted using a software package (SPSS 8.0; SPSS Inc., Chicago, IL, USA) and $P<0.05$ was considered statistically significant. Analysis of variance was used for Normally distributed continuous variables; Mann–Whitney U-test was used for variables in ordered categories and χ^2 statistics, or Fisher's exact test when appropriate, were used for categorical data.

Table 1

Summary of items included in the intensive care unit memory tool

Period/objective	Item	Details
Before ICU admission	1	Do you remember being admitted to hospital?
	2	Can you remember the time in hospital before you were admitted to intensive care?
During ICU stay	3	Do you remember being in intensive care?
	4a	Do you remember the whole stay clearly?
	4b	What do you remember? (A checklist of 11 factual events, six feelings and four delusional memories to increase recall of ICU stay is included; see Table 3)
	5	Do you remember being transferred from intensive care to the general wards?
Identify PTSD-related symptoms	6	Have you had any unexplained feelings of panic or apprehension?
	7	Have you had any intrusive memories from your time in hospital or of the event that led to your admission?

PTSD, post-traumatic stress disorder.

Table 2

Demographic and clinical data of patients interviewed 1 week after intensive care unit discharge

Parameter	Value
Number of patients	93
Male sex	56 (60.2%)
Age (years)	66.4 ± 14.8
Age range	20–89
At ICU admission	
APACHE II score	14 (11–18)
SAPS II score	34 (28–41)
PHM according to SAPS II	15.3 (8.8–26.6)
Duration (days) of	
Artificial ventilation	5.7 ± 9.6
Artificial ventilation range	0–64
ICU stay (mean [range])	8.5 ± 10.9 (3–72)
Number of patients according to reason for ICU admission	
Peritonitis/abdominal abscess/pancreatitis	13
Left ventricular failure	12
Acute respiratory failure ($PaO_2/FiO_2 < 200$)	10
Exacerbation of COPD	10
Shock	7
Trauma	7
Pneumonia	5
Cardiac arrhythmia	5
Gastric haemorrhage	2
Hepatic failure	2
Admissions after surgery (non emergent)	20

Acute Physiology and Chronic Health Evaluation (APACHE) II, Simplified Acute Physiology Score (SAPS) II, and predicted hospital mortality (PHM) according to SAPS II are reported as median (interquartile range). COPD, chronic obstructive pulmonary disease; FiO_2, fractional inspired oxygen; ICU, intensive care unit; ICUM, Intensive Care Unit Memory (tool); PaO_2, arterial oxygen tension.

The stability of memories was assessed using Kappa (κ) statistics, which were weighted when the item allowed more than two categories [22]. Kappa statistics were preferred over intraclass correlation coefficient, bearing in mind that memories fall into ordered categories rather than a numerical range. Kappa is a measure rather than a test: κ values equal to 1 indicate perfect agreement and those greater than 0.75 indicate excellent agreement; κ values under 0.4 suggest poor concordance.

Results

Demographic and clinical data (APACHE II, SAPS II, type of ICU admission, and durations of mechanical ventilation and ICU stay) of the patients who were interviewed ($n = 93$) and those who were not interviewed ($n = 16$) did not exhibit any statistically significant difference. The general characteristics and the reasons for ICU admission of patients participating in the study are summarized in Table 2.

Kappa values, assessing the stability of memories over time in the 67 patients who underwent both interviews, are reported in Table 3. Among memories of factual events, ward rounds, darkness and alarms were remembered at the second interview by 84%, 44% and 88%, respectively, of patients who remembered the same item at the first interview. The same recollections were reported at the second interview by 33%, 7% and 42%, respectively, of the patients who did not report them at the first interview. Feelings of panic (the feeling memory with the lowest κ value) were reported at the second interview by one of the two patients who remembered it at the first interview, and by two of the 65 who did not remember it at the first interview.

Table 3

Stability of memories over time

Type of memory	κ
Memories for factual events	
Family	0.50
Alarms	0.40
Voices	0.64
Lights	0.56
Faces	0.53
Breathing tube	0.82
Suctioning	0.70
Darkness	0.39
Clock	0.61
Tube in your nose	0.78
Ward round	0.32
Memories for feelings	
Being uncomfortable	0.62
Feeling confused	0.72
Feeling down	0.71
Feeling anxious/frightened	0.59
Panic	0.38
Pain	0.80
Delusional memories	
Feeling that people were trying to hurt you	0.73
Hallucinations	0.68
Nightmares	0.78
Dreams	0.68

Shown are Kappa (κ) values for the memories in the checklist of item 4b (see Table 1) of the Intensive Care Unit Memory (ICUM) tool.

Of the 87 patients who underwent the first interview, those who reported that they did not remember their ICU stay clearly ($n = 62$) were compared with those who reported that they did ($n = 25$; Table 4). Those with no memory of the ICU were more frequently admitted to the ICU urgently and had significantly longer durations of ICU stay and mechanical ventilation than did those who remembered the ICU. Thirty-three patients (53%) without a clear memory of the ICU and seven patients (28%) with a clear memory of the ICU reported delusional memories. In the patients with a clear memory of the ICU, the number of memories of factual events was higher and that of delusional memories lower than in the patients without a clear memory of the ICU.

The patients with infection at any time during their ICU stay (Table 5) appeared to be significantly younger, to be more

Table 4

Clinical characteristics of the patients interviewed according to memory of the intensive care unit

	Clear recollection of ICU stay?		
Parameter	Yes	No	*P*
Number of patients	25	62	–
Male sex	14 (56%)	37 (60%)	0.468
Age (years; mean [range])	68.1 ± 13.1 (20–87)	65.5 ± 15.0 (25–89)	0.450
Unscheduled ICU admission	10 (40%)	40 (65%)	**0.032**
APACHE II score	15 (9–18)	14 (12–17)	0.903
SAPS II score	34 (27–37)	35 (29–42)	0.487
Mean daily dose of morphine (mg)	19 ± 11	48 ± 131	0.309
No of patients receiving			
Propofol	2 (8%)	18 (29%)	**0.028**
Benzodiazepine	8 (32%)	33 (53%)	0.059
Neuroleptics	1 (4%)	14 (23%)	**0.031**
Duration (days) of			
Stay in ICU	6.2±7.0	9.5±12.3	**0.027**
Stay in ICU range	3-37	3-72	
Mechanical ventilation (mean [range])	2.5 ± 1.9 (0–8)	7.0 ± 11.4 (0–64)	**0.042**
Number of			
Factual events	8 (7–9)	7 (5–8)	**0.018**
Feelings	2 (0–3)	1 (1–2)	0.740
Delusional memories	0 (0–1)	1 (0–1)	**0.036**

Severity scores Acute Physiology and Chronic Health Evaluation (APACHE) II and Simplified Acute Physiology Score (SAPS) II, and the number of factual, feelings and delusional memories are reported as median (interquartile range). Statistically significant findings are highlighted in bold. ICU, intensive care unit.

frequently admitted to ICU urgently, and to have greater SAPS II scores than did those without infection. Also, the maximum temperature recorded during the ICU stay was greater, and the durations of both mechanical ventilation and ICU stay were longer in the patients with infection than in those without it. Infected patients reported significantly more feelings and delusional memories than did those without infection. Seventeen out of 49 patients without infection (35%) had one or two delusional memories, and 23 out of 38 patients with infection (60%) had one to four delusional memories ($P=0.029$). Moreover, 33 out of 49 patients without infection (67%) had one or two feeling memories, and 32 out of 38 patients with infection (84%) had one to four feeling memories.

Discussion

The present study demonstrates three facts. First, delusional memories are the most persistent over time, followed by feeling memories, whereas only some memories of factual events were stable. Second, the patients without a clear memory of the ICU and the patients with infection reported a greater number of delusional memories than did those with a clear memory of the ICU and those without infection, respectively. Third, the ICUM instrument is of value in a setting and language different from those in which it was created and used [10,11].

The ICUM instrument was translated according to rules indicated in the literature [12] and it was administered face to face when patients were in hospital and by telephone at follow up. As a result, the percentage of patients who missed the first questionnaire administration was low (15%). Moreover, the characteristics of the patients who underwent and those who missed the first interview were not significantly different.

In comparison with the original study conducted to validate the ICUM tool [10], our sample of patients was different with respect to sex (males being 60% versus 44%) and median age (being higher: 69 years versus 57 years). These differences in the ICU populations strengthen the results of the present study.

The stability of all delusional memories over time, demonstrated by a minimum κ value of 0.68, appeared to be impressive, but also some factual events (breathing tube, tube in the nose and suctioning) and feelings (pain, feeling confused and feeling down) were persistent. On the other hand, analyses of single items with κ value below 0.4 suggested a change over time. During the 3-month interval between the two interviews, the patients tended to forget darkness and to remember ward rounds and alarms. It is possible that these memories were

Table 5

Characteristics of patients interviewed according to the presence or absence of infection at any time

	Presence of infection		
Parameter	No	Yes	*P*
Number of patients	49	38	
Male sex	27 (55%)	24 (63%)	0.296
Age (years)	69.2 ± 10.3	62.4 ± 17.9	**0.028**
Unscheduled ICU admission	23 (47%)	26 (68%)	**0.020**
APACHE II score	13 (11–18)	15 (12–17)	0.297
SAPS II score	33 (27–39)	38 (30–46)	**0.004**
Max body temperature (°C)	37.7 ± 0.6	38.3 ± 0.8	**0.001**
Mean daily dose of morphine (mg)	23 ± 13	61 ± 167	0.150
Duration (days) of			
Stay in ICU	5.3 ± 5.1	12.7 ± 14.9	**0.001**
Mechanical ventilation	2.4 ± 2.0	10.0 ± 13.7	**0.001**
Number of			
Factual events	8 (5–9)	7 (6–8)	0.523
Feelings	1 (0–2)	2 (1–3)	**0.007**
Delusional memories	0 (0–1)	1 (0–2)	**0.005**

Severity scores Acute Physiology and Chronic Health Evaluation (APACHE) II and Simplified Acute Physiology Score (SAPS) II are reported as median (interquartile range). The number of factual, feelings and delusional memories are reported both as median (interquartile range) and as range. Statistically significant findings are highlighted in bold. ICU, intensive care unit.

influenced by the information received by others (family, friends), or that patients 1 week after ICU discharge were not thinking as clearly as they were 3 months later. The stability of delusional memories in the present study is in accordance with the findings reported by Jones and coworkers [11], who hypothesized that these memories may be related to post-traumatic stress disorder related symptoms.

The patients without a clear memory of the ICU had significantly longer durations of ICU stay and mechanical ventilation than did those who did have such a recollection. The finding that the number of factual memories was different between the patients without and those with a clear memory of the ICU is consistent with the general lack of clear memory. It could have been influenced by the more frequent use of propofol in the patients without a clear memory of the ICU than in those with such a memory because this drug has been reported to cause profound amnesia [23]. However, this is only speculative because the small number of patients who were sedated in the present study and the concomitant effect of many drugs administered do not allow conclusions to be drawn. On the other hand, the fact that delusional memories were more frequent in the group of patients without a memory of the ICU is consistent with the more frequent use of neuroleptics as agents of choice for treatment of delirium [24,25].

The significantly different number of delusional memories reported between patients with and those without infection confirms the theoretical prediction that patients with infection should have more delusional memories than those without infection.

Conclusion

In conclusion, the present study demonstrates that the ICUM tool may be of value in a language and a country different from those in which it was created, and in an ICU population with demographic characteristics that differ from those of the original sample. More importantly, delusional memories, as classified by the instrument, appear to be the most persistent recollections and are frequently associated both with lack of clear memory of the ICU stay and with the presence of infec-

Key messages

- Delusional memories are the most persistent over time
- Patients without a clear memory of the ICU and those with infection reported a greater number of delusional memories than did those with a clear memory of the ICU and those without infection, respectively
- The ICUM instrument is of value in a setting and language different from that in which it was created and used

tion during ICU stay. On the basis of our findings, we suggest that prevention of ICU-acquired infections may reduce the incidence of delusional memories and, hypothetically, post-traumatic stress disorder related symptoms.

Competing interests

None declared.

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References

1. Bergbom-Engeberg I, Haljamäe H: **Assessment of patients' experience of discomforts during respiratory therapy.** *Crit Care Med* 1989, **17:**1068-1072.
2. Turner JS, Briggs SJ, Springhorn HE, Potgieter PD: **Patients' recollection of intensive care unit experience.** *Crit Care Med* 1990, **18:**966-968.
3. Novaes MA, Knobel E, Bork AM, Pavao OF, Nogueira-Martins LA, Ferraz MB: **Stressors in ICI: patients' evaluation.** *Intensive Care Med* 1997, **23:**1282-1285.
4. Pennock BE, Crawshaw L, Maher T, Price T, Kaplan PD: **Distressful events in the ICU as perceived by patients recovering from coronary artery bypass surgery.** *Heart Lung* 1994, **23:** 323-327.
5. Elpern EH, Patterson PA, Gloskey D, Bone RC: **Patients' preferences for intensive care.** *Crit Care Med* 1992, **20:**43-47.
6. Rotondi AJ, Chelluri L, Sirio C, Mendelsohn A, Schulz R, Belle S, Im K, Donahoe M, Pinsky MR: **Patients' recollections of stressful experiences while receiving prolonged mechanical ventilation in an intensive care unit.** *Crit Care Med* 2002, **30:**746-752.
7. Hallenberg B, Bergbom-Engeberg I, Haljamäe H: **Patients' experiences of postoperative respirator treatment: influence of anaesthetic and pain treatment regimens.** *Acta Anaesth Scand* 1990, **34:**557-562.
8. Capuzzo M, Pinamonti A, Cingolani E, Grassi L, Bianconi M, Contu P, Gritti G, Alvisi R: **Analgesia, sedation, and memory of intensive care.** *J Crit Care* 2001, **16:**83-89.
9. Rundshagen I, Schnabel K, Wegner C, Schulte am Esch J: **Incidence of recall, nightmares, and hallucinations during analgosedation in intensive care.** *Intensive Care Med* 2002, **28:** 38-43.
10. Jones C, Humphris G, Griffiths RD: **Preliminary validation of the ICUM tool for assessing memory of the intensive care experience.** *Clin Intensive Care* 2000, **11:**251-253.
11. Jones C, Griffiths RD, Humphris G, Skirrow PM: **Memory, delusions, and the development of acute posttraumatic stress disorder-related symptoms after intensive care.** *Crit Care Med* 2001, **29:**573-580.
12. Chang AM, Chau JP, Holroyd E: **Translation of questionnaires and issues of equivalence.** *J Adv Nurs* 1999, **29:**316-322.
13. Knaus WA, Draper EA, Wagner DP, Zimmerman JE: **APACHE II: a severity of disease classification system.** *Crit Care Med* 1985, **13:**818-829.
14. Le Gall JR, Lemeshow S, Saulnier F: **A new simplified acute physiology score (SAPS II) based on a European/North American multicenter study.** *JAMA* 1993, **270:**2957-2963.
15. Guyatt GH, Feeny D, Patrick DL: **Measuring health-related quality of life.** *Ann Intern Med* 1993, **118:**622-629.
16. Knapp TR: **Coefficient alpha: conceptualizations and anomalies.** *Res Nurs Health* 1991, **14:**457-460.
17. Ely EW, Gautam S, Margolin R, Francis J, May L, Speroff T, Truman B, Dittus R, Bernard R, Inouye SK: **The impact of delirium in the intensive care unit on hospital length of stay.** *Intensive Care Med* 2001, **27:**1892-1900.
18. Jones C, Griffiths RD: **Disturbed memory and amnesia related to intensive care.** *Memory* 2000, **8:**79-94.
19. Breitbart W, Gibson C, Tremblay A: **The delirium experience: delirium recall and delirium-related distress in hospitalized patients with cancer, their spouses/caregivers, and their nurses.** *Psychosomatics* 2002, **43:**183-194.
20. Bleck TP, Smith MC, Pierre-Louis SJ-C, Jares JJ, Murray J, Hansen CA: **Neurologic complications of critical medical illnesses.** *Crit Care Med* 1993, **21:**98-103.
21. Papadopoulos MC, Davies CD, Moss RF, Tighe D, Bennett DE: **Pathophysiology of septic encephalopathy: a review.** *Crit Care Med* 2000, **28:**3019-3024.
22. Fleiss JL: **The measurement of interrater agreement.** In *Statistical Methods for Rates and Proportions*, 2nd ed. Edited by Fleiss JL. New York: Wiley; 1981:221-225.
23. Barr G, Anderson RE, Öwall A, Jakobsson JG: **Being awake intermittently during propofol-induced hypnosis: a study of BIS, explicit and implicit memory.** *Acta Anaesthesiol Scand* 2001, **45:**834-838.
24. Dasta JF: **The management of the agitated ICU patient. ICU sedative pharmacology update: a review of commonly used and emerging agents.** *Crit Care Med* 2002, **30(suppl 1):**S104-S110.
25. American Psychiatric Association: **Practice guideline for the treatment of patients with delirium.** *Am J Psychiatry* 1999, **156:** 1-20.

Appendix A

ICU memory questionnaire (translated from Jones and coworkers [10]).

Item 1. Si ricorda di essere stato ricoverato in ospedale?
Chiaramente/Confusamente/Per nulla

Item 2. Si ricorda del periodo in ospedale, prima di essere ricoverato in ICU?
Tutto/Qualcosa/Nulla

Item 3. Si ricorda di essere stato ricoverato in Terapia Intensiva? Si/No

Item 4a. Ricorda tutto il ricovero chiaramente? Si/No

Item 4b. Che cosa ricorda del suo ricovero in ICU ? (Fare un cerchio/evidenziare)
Familiari
Allarmi
Voci
Luci
Facce
Tubo per respirare
Aspirazioni di catarro
Scomodità
Buio
Orologio
Tubo nel naso
Visita dei medici
Senso di testa confusa
Sensazione di sentirsi giù
Ansia/paura
Sensazione che volessero farle del male
Allucinazioni
Incubi
Sogni
Panico/terrore
Dolore

Item 4c. Se ha avuto la sensazione che qualcuno cercasse di farle del male o impaurirla durante il ricovero in Terapia Intensiva, per piacere descriva queste sensazioni……

Item 4d. Se ha avuto incubi o allucinazioni durante il ricovero in Terapia Intensiva, per piacere li descriva.
……

Item 5. Si ricorda di essere stato trasferito dalla Terapia Intensiva al reparto?
Chiaramente/Confusamente/Per nulla

Item 6. Ha avuto qualche inspiegabile sensazione di panico o apprensione? Si/No

Item 6a. Se si, cosa stava facendo quando ha avuto queste sensazioni? ……..

Item 7. Ha avuto qualche pensiero che si ripete di continuo, di cui non riesce a liberarsi, di quando era in ospedale o del fatto che ha portato al suo ricovero in ospedale? Si/No

Item 7a. Se si, cosa stava facendo quando ha avuto questi pensieri?……

Item 7b. In cosa consistono questi pensieri? ……

Item 8. Con chi ha parlato di quello che le è accaduto in Terapia Intensiva?
Un familiare/Un infermiere/a di reparto /Un amico/Un medico di reparto/Il suo medico di base