

Impact of a Visual Support Dedicated to Prognosis on Symptoms of Stress of ICU Family Members: A Before-and-After Implementation Study

OBJECTIVES: Family members commonly have inaccurate expectations of patient's prognosis in ICU. Adding to classic oral information, a visual support, depicting day by day the evolution of the condition of the patient, improves the concordance in prognosis estimate between physicians and family members. The objective of this study was to evaluate the impact of this tool on symptoms of anxiety/depression of family members.

DESIGN: Bicenter prospective before-and-after study.

SETTING: A nonacademic and a university hospital.

SUBJECTS: Relatives of consecutive patients admitted in the two ICUs.

INTERVENTIONS: In the period "before," family members received classic oral information, and in the period "after," they could consult the visual support in the patient's room. The primary endpoint was the Hospital Anxiety and Depression Scale score of relatives at day 5. Secondary outcomes were the prevalence of symptoms of anxiety (Hospital Anxiety and Depression Scale anxiety subscale score > 7) and depression (Hospital Anxiety and Depression Scale depression subscale score > 7) at day 5 and Hospital Anxiety and Depression Scale score at day 90.

MEASUREMENTS AND MAIN RESULTS: A total of 140 patients and their referent family members were included (77 in period before and 63 after). Characteristics of patients of the two groups were similar regarding age, reason for admission, Simplified Acute Physiology Score II at admission, and Sequential Organ Failure Assessment score at day 5. At day 5, median Hospital Anxiety and Depression Scale score was 17 (9–25) before and 15 (10–22) after the implementation of the visual support ($p = 0.43$). The prevalence of symptoms of anxiety and depression was similar in the two groups (66.2% and 49.4% before and 68.3% and 36.5% after [not significant], respectively). At day 90, median Hospital Anxiety and Depression Scale score was 11 before (7–16) and 9 (5–16) after the implementation of the tool ($p = 0.38$).

CONCLUSIONS: In this study, the use of a visual support tool dedicated to prognosis did not modify the level of stress of family members.

KEY WORDS: critically ill patients; prognosis; symptoms of anxiety and depression; understanding of medical information; visual aid

ICU is a stressful environment. Families are confronted with an intense experience associating psychological and physical suffering throughout the stay of their loved ones (1–3). They have to deal with the uncertainty on vital prognosis of the patient and the lack of understanding of the techniques and therapies used in ICU. Problems with communication between clinicians and surrogates in ICUs have been well documented; these include a failure to conduct timely interdisciplinary meetings with the family (4, 5),

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missed opportunities to provide emotional support to surrogates (6, 7) and inadequate discussion of prognosis (8, 9), patients' values (10, 11), and the option of comfort-focused treatment (12). These breakdowns in communication may contribute to the use of expensive, burdensome treatments that do not align with patients' values and preferences (13, 14) and to long-term symptoms of psychologic distress among surrogates (15, 16).

To be well-informed participants in decision-making, surrogates need a clear understanding of the patient's prognosis with intensive treatment (17). Furthermore, families who are too far from the reality of the prognosis will not be sufficiently prepared for the eventual death of their loved one (18). Unfortunately, family members commonly have inaccurate expectations of patient's prognosis (19–21).

For some people, visual memory or comprehension is more effective than oral communication. A previous study showed that the use of a visual support tool of information, dedicated to family members, available in the room of the patient and depicting graphically day by day the evolution of his condition, allowed to reduce the discordance between physicians and family about prognosis (22). In addition, family members reported receiving higher quality of information with the support added to classic oral information.

This offered the opportunity to evaluate whether improving the understanding of the information obtained through the support allows a better experience of families. Several studies report a prevalence of 60–80% of symptoms of anxiety and/or depression in family members during the stay in intensive care (1, 23, 24).

We conducted a before-and-after implementation clinical trial to evaluate the impact of the visual support tool in addition to classic oral information on symptoms of stress of family members, assessed by the Hospital Anxiety and Depression Scale (HADS) (25) at day 5.

PATIENTS AND METHODS

Design

We conducted a prospective before-and-after implementation study in two French adult (12-bed and 18-bed) ICUs. The ethics committee of the University Hospital of Saint Etienne approved the study (IRBN122017/CHUSTE) on March 13, 2017.

Patients and Procedures

We enrolled consecutive adult patients and family members on the day of critically ill patient's admission, from May 1, 2017, to October 31, 2017. Patients were eligible if they were 18 years old or older and had an estimated length of stay of more than 48 hours. Patients were excluded if they refused that physicians communicate medical information to their family. On the admission day, physicians met the family during a private interview to explain the reasons of admission and ongoing therapies. This interview detailed also the visiting policy (visiting hours, phone number for daily calls). Patients could not be included in the study if this first interview was not performed within the first 24 hours, to ensure that all participating families were treated in the same way.

In the period "Before" from May 1 to July 31, 2017, families of the patients included were informed in a traditional way according to the protocols of the unit: interview in a dedicated room after the admission of the patient, daily visits according to the schedules of each unit, meeting with a physician in a dedicated room on request and at each particular event, phone call by the paramedical staff, and appointment with the physicians if necessary. In the period "After," from August 1 to October 31, 2017, family members could consult the visual support tool previously described (22). Briefly, every day in the morning, physicians assessed global, hemodynamic, respiratory, renal, and neurologic conditions of each patient and put a point on the five related curves of the visual aid (**Fig. 1**). The addition of new points allowed to visualize curves illustrating the evolution of the condition of the patient during his ICU stay. The visual aid remained in the patient's room, available for family members. They could therefore take note of the patient's evaluation when they came to visit. In addition to the visual aid, family members obviously continued to receive conventional oral information (phone call several times by day and meeting with physicians when needed). Visual support stayed in the patient's room and was daily filled until discharge from the ICU.

Study Outcomes

The primary study outcomes were the HADS score (25) and the prevalence of symptoms of anxiety (HADS anxiety subscale [HAD-A] score > 7) and depression (HADS depression subscale [HAD-D] score > 7) of

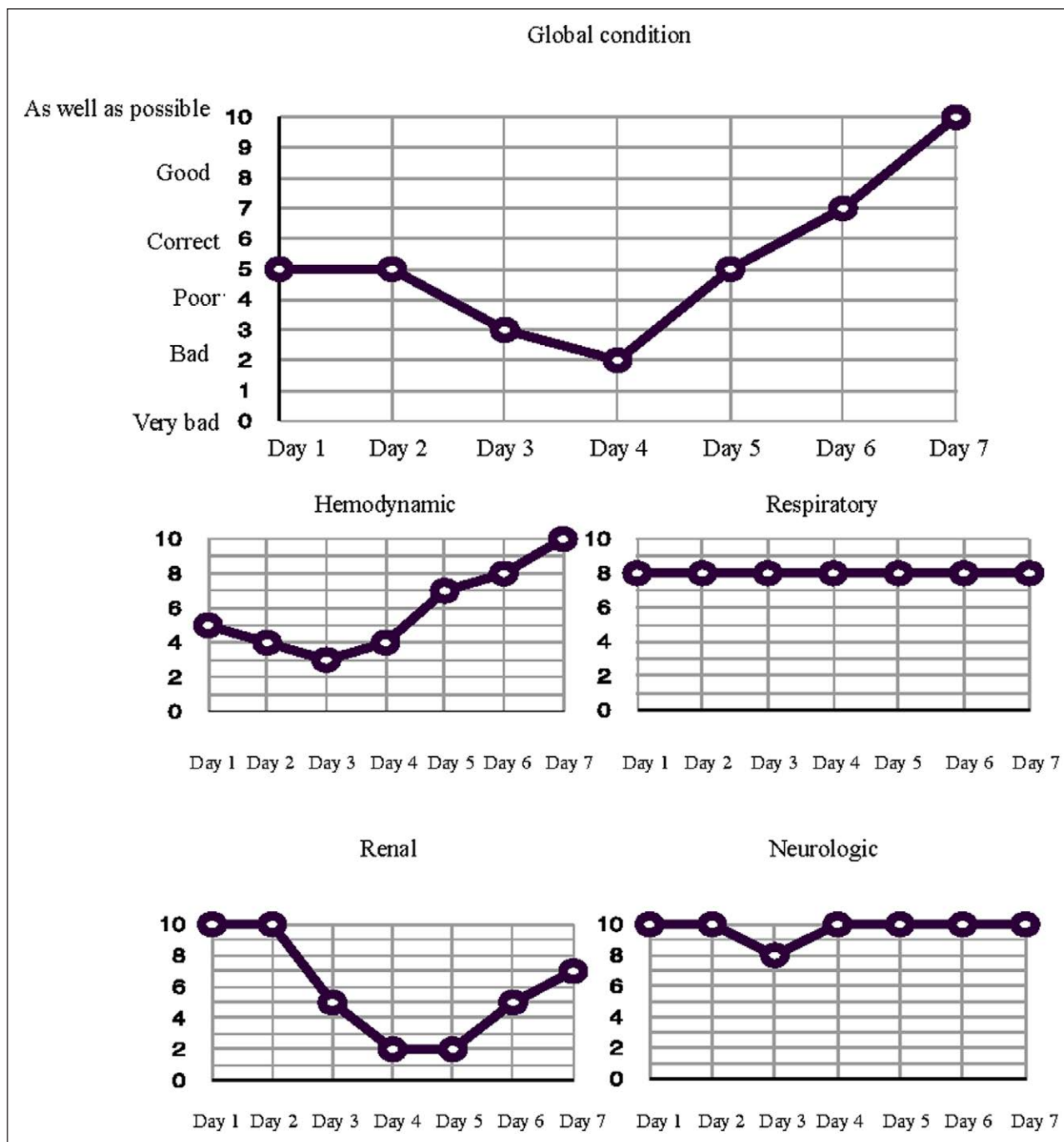


Figure 1. An example of the visual support for family members. Each point of the five curves depicts the daily assessment by the physician of the condition of the patient: global condition and assessment of hemodynamic, respiratory, renal, and neurologic functions.

referent family member at day 5 after the admission of the patient.

Secondary outcomes were the HADS score and the prevalence of symptoms of anxiety (HAD-A score > 7) and depression (HAD-D score > 7) of referent family member collected at 90 days from admission by phone interview. The referent family member was the one who visited the patient most frequently along the previous days.

Statistical Analysis

Based on previous studies, we sought to detect a decrease in the prevalence of anxiety and depression from 70% in the group before without the support to 50% in the group after with the support (1, 23, 24). Using a two-sided chi-square test, with α set at 0.05, to obtain 80% power, we needed 90 patients per period (180 patients in all). Due to a lower rate of inclusion

than expected, the study was stopped after inclusion of 140 patients.

All analyses were performed on an intention to treat population, defined as all included patients. Categorical data were described as frequencies and proportions and were compared before and after the implementation of the visual support tool using chi-square test or Fisher exact test. The Shapiro-Wilk test was used to examine the normality of distribution of continuous outcomes, including the primary outcome and total HADS at day 5. Normally distributed continuous variables were described as the mean ± SD and were compared before and after the implementation of the visual support using Student *t* test. Continuous data that were not normally distributed

were presented as median, first quartile (Q1), and third quartile (Q3) and were compared before and after the implementation of the visual support using the Wilcoxon test. Univariate analyses were performed using a logistic regression model to screen for potential variables associated with a total HADS score greater than or equal to 13 (26) of referent family member at day 5. Variables with a *p* value of less than 0.20 were entered into the final multivariate model. Prior to the multivariate analysis, correlations between these variables were systematically searched. Finally, factors with a *p* value of less than 0.05 in the multivariate analysis were considered as independent factors. The same method was used to screen for potential variables associated with HAD-A score greater

TABLE 1.
Patients and Family Members' Characteristics

Characteristics	Group Before the Implementation of the Visual Support (N = 77)	Group After the Implementation of the Visual Support (N = 63)
Patients		
Age, yr, median (IQR)	65 (4–74)	68 (57–72)
Gender, male, <i>n</i> (%) ^a	58 (75.3)	33 (52.4)
Admission diagnosis, <i>n</i> (%)		
Respiratory failure	15 (19.5)	22 (34.9)
Shock	24 (31.2)	19 (30.2)
Coma	28 (36.4)	14 (22.2)
Renal failure	4 (5.2)	5 (7.9)
Postoperative	4 (5.2)	2 (3.2)
Gastrointestinal failure	2 (2.6)	1 (1.6)
Simplified Acute Physiology Score II at admission, median (IQR)	45 (30–56)	48 (33–61)
Sequential Organ Failure Assessment score at day 5, median (IQR)	5 (2–8)	5 (2–7)
Referent family members		
Age, yr, median (IQR)	57 (45–66)	54 (43–66)
Gender, male, <i>n</i> (%)	24 (31.2)	21 (33.3)
Relationship to the patient, <i>n</i> (%)		
Spouse/partner	39 (50.6)	30 (47.6)
Children	19 (24.7)	18 (28.6)
Other	19 (24.7)	15 (23.8)
Number of visits at day 5, median (IQR)	5 (4–5)	5 (4–5)
Treatment for anxiety/depression, <i>n</i> (%)	20 (26)	14 (22.2)
Meeting with psychologist of ICU, <i>n</i> (%)	7 (9.1)	5 (7.9)

IQR = interquartile range.

^a*p* < 0.01.

than 7 at day 5, HAD-D score greater than 7 at day 5, total HADS score greater than or equal to 13 at day 90, HAD-A score greater than 7 at day 90, and HAD-D score greater than 7 at day 90. The analyses were performed using SAS software, Version 9.4 (SAS, Cary, NC).

RESULTS

A total of 140 patients and their referent family members were included (77 in period before and 63 after). Characteristics of patients of the two groups were similar regarding age, reason for admission, Simplified Acute Physiology Score II at admission, and Sequential Organ Failure Assessment score at day 5; however, there was a higher proportion of men in the period before (**Table 1**). Characteristics of referent family members were comparable in terms of age, sex ratio, type of relationship with the patient, and number of visits since admission. The relatives were usually spouses/partners ($n = 69$; 49.3%) or children ($n = 37$; 26.4%).

Outcomes

At day 5, median total HADS score was 17 (9–25) in the group before the implementation of the visual

support tool and 15 (10–22) in the group after the implementation of the tool ($p = 0.43$) (**Table 2**).

There was no significant difference in the HAD-A score (10 [6–13] vs 9 [7–12]; $p = 0.58$) nor in the HAD-D score (7 [3–11] vs 6 [2–9]; $p = 0.31$). Also the prevalence of symptoms of anxiety and depression was similar in the two groups (66.2% and 49.4% in the group before, and 68.3% and 36.5% in the group after not significant [NS], respectively).

At day 90, interviews were conducted for 68 relatives (88%) before the implementation of the visual support tool and 48 (76%) after the implementation of the tool. The median total HADS score was 11 in the group before the implementation of the visual support tool (7–16) and 9 (5–16) in the group after the implementation of the tool ($p = 0.38$). The prevalence of symptoms of anxiety and depression was similar in the two groups (44.1% and 14.7% in the group before, and 35.4% and 25% in the group after [NS], respectively).

Risk Factors

Table 3 reports the results of multivariate models for each outcome measure at day 5, where only variables

TABLE 2.
Primary and Secondary Outcomes

Outcomes	Group Before the Implementation of the Visual Support	Group After the Implementation of the Visual Support	p
Primary outcome at day 5	$N = 77$	$N = 63$	
Total HADS score, median (IQR)	17 (9–25)	15 (10–22)	0.43
Secondary outcomes at day 5	$N = 77$	$N = 63$	
HAD-A score, median (IQR)	10 (6–13)	9 (7–12)	0.58
Symptoms of anxiety ^a , n (%)	51 (66.2)	43 (68.3)	0.80
HAD-D score, median (IQR)	7 (3–11)	6 (2–9)	0.31
Symptoms of depression ^b , n (%)	38 (49.4)	23 (36.5)	0.13
Secondary outcomes at day 90	$N = 68$	$N = 48$	
Total HADS score, median (IQR)	11 (7–16)	9 (5–16)	0.38
HAD-A score, median (IQR)	7 (5–10)	6 (4–9)	0.12
Symptoms of anxiety ^a , n (%)	30 (44.1)	17 (35.4)	0.35
HAD-D score, median (IQR)	3 (1–6)	4 (0–7.5)	0.93
Symptoms of depression ^b , n (%)	10 (14.7)	12 (25)	0.16

HAD-A = HADS anxiety subscale, HAD-D = HADS depression subscale, HADS = Hospital Anxiety and Depression Scale, IQR = interquartile range.

^aHAD-A score > 7.

^bHAD-D score > 7.

TABLE 3.
Factors Associated With Outcomes at Day 5 by Multivariable Analyses

Risk Factors	ORs Multivariate (95% CIs)	p
Factors associated with total Hospital Anxiety and Depression Scale score ≥ 13		
Patient characteristics		
Age	0.98 (0.96–0.99)/yr	0.04
Female gender	0.67 (0.31–1.45)	0.31
Referent family member characteristics		
Referent who was spouse or partner	1.87 (0.88–3.98)	0.10
Number of visits of referent	2.72 (1.09–6.76)	0.03
Treatment of referent for anxiety/depression	2.76 (1.08–7.06)	0.03
Factors associated with anxiety symptoms ^a		
Patient characteristics		
Age	0.99 (0.97–1.01)	0.29
Female gender	0.53 (0.25–1.13)	0.10
Sequential Organ Failure Assessment score at day 5	1.12 (1.01–1.25)	0.03
Referent family member characteristics		
Referent who was spouse or partner	1.36 (0.63–2.91)	0.43
Treatment of referent for anxiety/depression	4.13 (1.45–11.8)	0.008
Factors associated with depression symptoms ^b		
Patient characteristics		
Female gender	0.45 (0.21–0.97)	0.04
Simplified Acute Physiology Score II at admission	1.02 (0.99–1.04)	0.07
Referent family member characteristics		
Female gender	1.30 (0.5–3.34)	0.59
Referent who worked	0.84 (0.38–1.87)	0.66
Referent who was spouse or partner	3.90 (1.89–8.05)	0.0002
Number of visits of referent	2.11 (0.74–6.05)	0.16
Treatment of referent for anxiety/depression	1.51 (0.62–3.64)	0.36
Referent who met the psychologist of ICU	3.32 (0.79–13.9)	0.10
Presence of the visual support	0.58 (0.26–1.29)	0.18

OR = odds ratio.

^aHospital Anxiety and Depression Scale (HADS) anxiety subscale score > 7.

^bHADS depression subscale score > 7.

selected by univariable analyses were introduced jointly. The following factors were significantly associated with total HADS score greater than or equal to 13 at day 5: age of patient (odds ratio [OR] 0.98 [0.96–0.999]), number of visits of referent (namely four visits or more) (OR, 2.72 [1.09–6.76]), and previous or current treatment of referent for anxiety or depression (OR, 2.76 [1.08–7.06]). The results of multivariate models for outcome measures at day 90 are

detailed in **Table 4**. At day 90, the spouse or partner status of the relative was significantly associated with total HADS score greater than or equal to 13 (OR, 2.87 [1.31–6.26]). In all multivariate analyses, the presence of the visual support tool did not significantly impact symptoms of anxiety and depression. When focusing on the group with the support, the profile of the support—stable, improving, or worsening from day 1 to day 5—did not significantly impact HADS score.

TABLE 4.
Factors Associated With Outcomes at Day 90 by Multivariable Analyses

Risk Factors	OR Multivariate (95% CIs)	p
Factors associated with total Hospital Anxiety and Depression Scale score ≥ 13		
Patient characteristics		
SAPS II at admission	1.01 (0.99–1.04)	0.19
Referent family member characteristics		
Female gender	2.08 (0.87–4.99)	0.10
Referent who was spouse or partner	2.87 (1.31–6.26)	0.01
Factors associated with anxiety symptoms ^a		
Patient characteristics		
Female gender	0.42 (0.18–0.96)	0.04
Referent family member characteristics		
Referent who was spouse or partner	1.85 (0.86–3.98)	0.11
Treatment of referent for anxiety/depression	1.78 (0.72–4.42)	0.21
Factors associated with depression symptoms ^b		
Patient characteristics		
SAPS II at admission	1.04 (1.01–1.07)	0.004
Patient living at day 90	1.57 (0.45–5.49)	0.48
Referent family member characteristics		
Referent who was spouse or partner	5.03 (1.60–15.8)	0.01
Treatment of referent for anxiety/depression	1.51 (0.48–4.77)	0.49
Presence of the visual support	1.89 (0.67–5.34)	0.23

OR = odds ratio, SAPS = Simplified Acute Physiology Score.

^aHospital Anxiety and Depression Scale (HADS) anxiety subscale score > 7 .

^bHADS depression subscale score > 7 .

DISCUSSION

In this before-and-after implementation study, the use of a visual support tool depicting the evolution of the patient's condition day after day did not reduce the symptoms of anxiety and depression in family members of critically ill patients.

A negative correlation between the incidence of symptoms of anxiety and depression and the quality of the information received has been demonstrated (1). Therefore, the higher quality of information previously reported by family members with the visual support (22) was encouraging. Physicians perceived better communication with families. They consulted the support as soon as they came in the patient's room in order to obtain first information before they could meet the physicians. The support allowed the families to prepare the meeting with the physician; their

questions were more accurate, and the answers were thus better understood. In the previous study, families frequently said their disappointment after the seventh day when the visual support was removed from the patient's room. Therefore for this study, the visual support was filled and available for family members along all the stay of the patient in the ICU.

Several hypotheses may explain the lack of reduction of symptoms of stress in family members with the visual support tool. First, HADS which focuses on symptoms of anxiety and depression may not be the best measure for evaluating symptoms of stress of families in the first days of ICU stay. The questions asked may not be appropriate for the emotional overload experienced by families. Another approach might be the assessment of posttraumatic stress symptoms (15, 23). Interestingly, the use of an information brochure and website dedicated to families improved—similarly to

our visual support—the concordance about prognosis between physicians and families, did not reduce HADS scores but was associated with a reduction in posttraumatic stress symptoms (24). Furthermore, we choose to measure HADS score at day 5, based on previous studies (1, 23, 24); maybe, it would have been more appropriate to let longer time for family members to use the support before evaluating his effect on symptoms of stress. Second, the support may have had a paradoxical effect. On one hand, families are satisfied with the support acting as a reference always available and updated; on the other hand, they are confronted at each visit with the serious state of their loved one, without the uncertainty which may maintain hope (27, 28). This raises the question of whether too much information on prognosis may be traumatic for the family (29), particularly in situations where the prognosis is poor. However, when focusing on the group with the support, the profile of the support—stable, improving, or worsening—did not significantly impact HADS score. Third, it is possible that the level of psychologic distress of ICU family members might not be altered by a single and standardized intervention focusing on prognosis of the patient. Two interventions which used a strategy personalized and adapted to family needs were effective. A multifaceted intervention associating a family conference centered on family talk, emotions, questions, and a bereavement brochure decreased symptoms of anxiety and depression at day 90 (30). Also, the use of a communication facilitator between physicians and families reduced symptoms of depression at 6 months in relatives (31). A qualitative evaluation by families of the visual support might allow to optimize his format in order to answer more accurately to their requests.

The multivariate analysis showed that symptoms of anxiety/depression of relatives at day 5 decreased significantly with patient's age, as previously reported (23, 24). Interestingly, this is the first study to show an association between the number of visits of family member and the intensity of symptoms of anxiety/depression. There are here two potential explanations: this suggests the traumatic effect of each visit on relatives and the need to support them (32). However, we may not exclude that relatives with highest baseline level of anxiety would have visited the patient more frequently.

Strengths of our study include a visual support easy to use by physicians and to read by families, even in the case of a language barrier. The rate of follow-up at 3

months was high. The results have satisfactory external validity since the total HAD score and the prevalence of symptoms of anxiety and depression are consistent with previous studies (1, 23, 24).

This study has several limitations. First, our study may be underpowered, we planned to include 180 patients; however, 140 were effectively included during the study period. Furthermore, the study was not randomized, and the interviewers who collected the primary and secondary outcomes were not blinded to group allocation. Finally, the physician who performed daily assessment of the patient on the visual support was not the same every day during the first 5 days, and we may not exclude interindividual variability of this evaluation. However, we hypothesize that the trend of the curve from one day to another—which seems more important for family members than the absolute value of day point—was quite consensual between the physicians involved in the care of the patient.

CONCLUSIONS

This before-and-after implementation study showed that, in addition to classic oral information, the use of a visual support tool describing day by day the evolution of the condition of the patient did not modify the level of stress of family members.

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