PERCEPTUAL AND BEHAVIOURAL EFFECTS OF IMMOBILITY AND SOCIAL ISOLATION IN HOSPITALIZED ORTHOPEDIC PATIENTS

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Although psychological consequences have been attributed to situations where patients are immobilized or isolated, the evidence to date does not provide a clear basis to guide nursing intervention. Both laboratory (Zubek, Aftanas, Kovach, Wilgosh, & Winocur, 1963) and clinical studies (Bolin, 1974: Jackson, 1969; Johnson, 1976) have provided explanations of psychological changes in terms of "sensory deprivation". On the other hand, Suedfeld (1979), who prefers the more accurate term "restricted environmental stimulation", suggests that the critical variable leading to psychological effects in immobile orthopedic patients may be response restriction as opposed to reduced stimuli. To further complicate the picture, recent evidence (Stewart, 1984) suggests that perceptual changes (imagery) are linked to both immobilization and to overload of dimensions of social stimulation in a hospital setting. Interpretations of stimulus restriction, stimulus overload, and response restriction have different, and even opposing, implications for nursing intervention.

The literature on social isolation in hospital situations also leaves conflicting bases for intervention. In a study of 77 medical-surgical patients aged 21-86 years, Wood (1977) found that patients in a private room had more cognitive and perceptual changes than those in two-bed rooms. By contrast, Williams et al. (1979) found, in a sample of 91 elderly orthopedic patients, that there was less cognitive disturbance in a private room. Clearly, the problem with making a clinical decision on whether a private room has deleterious or beneficial effects stems from the fact that the hospital environment is a multivariate situation, with numerous confounding variables that may be uncontrolled or uncontrollable in a particular study. The laboratory research on monotonous environments has moved from evidence for negative (Heron, 1957) to positive (Suedfeld, 1975) effects because of changes in intervening variables such as the subject's expectations in a given environment.

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Perceptual changes, which have been linked to both immobility and social isolation, are unusual senses such as vivid imagery (Zuckerman, 1969 a) and altered time perception (Pollard, Uhr, & Jackson, 1963; Smith, 1975). Clinical research from an earlier era when eye surgery patients were confined to bedrest with bilateral eye patches (Ziskind, Jones, Filante, & Goldberg, 1960), provides evidence for both perceptual (imagery) and behavioural changes, particularly during hypnagogic periods of reduced awareness. The behavioural changes found were noncompliant behaviours such as sitting up (80% of sample) and removing eye patches (90%). The striking aspect of this finding was that patients had been warned that such behaviour could jeopardize their eyesight. The observations of Ziskind et al. suggest that this type of noncompliance was based on acting out vivid dreams or hypnagogic imagery in an involuntary way, despite motivation to the contrary. Bolin (1974) found comparable results in immobilized orthopedic patients who exhibited noncompliant behaviour, such as trying to remove traction or get out of bed, during periods of apparent dreaming. Immobile patients may demonstrate voluntary as well as involuntary noncompliance. Putnam and Yager (1978) use the term "traction intolerance syndrome" to describe behavioural changes in patients with a fractured femur. These changes include angry threats to staff and noncompliance with instructions during periods of normal awareness. These data suggest that noncompliant behaviour may be either voluntary or involuntary in association with imagery that occurs in an altered state of consciousness.

Theoretical Framework

Perceptual changes in environments with nonoptimal stimulation can be accounted for by Zuckerman's optimal level of stimulation theory (Zuckerman, 1969 b). According to this perspective, extremely restricted or excessive stimulation can lead to unusual visual or auditory sensations. These sensations have been labelled imagery rather than hallucinations for present purposes because they rarely meet criteria, such as apparent reality, that would be necessary to classify them as hallucinations (Suedfeld & Vernon, 1964). For example, visual sensations such as the appearance of bizarre, geometric designs on the ceiling of the room may be extremely vivid and yet the patient knows that the designs are not part of objective reality. By contrast, true hallucinations are perceived as real.

Laboratory research provides support for the relationship of imagery to nonoptimal environments. Zuckerman, Persky, Link, and Basu (1968) found that eight hours of restricted stimulation combined with uncertainty, led to "primary-process" effects such as dreams and images. Restriction of movement increased these effects. In a nursing laboratory study, which examined the effect of confinement to bed on the experience of time, Smith

(1975) reported that 23 of 180 subjects (7.83%) experienced unusual visual, auditory, olfactory and tactile sensations after two and one-half hours of bedrest.

Newman's model of health (Engle, 1983; Newman, 1983) includes the concepts of movement, time, space, and consciousness. The study of altered time perception in relation to immobility in a hospital setting can be examined from this framework. Research on the relationship of movement tempo (Newman, 1976) and movement restriction (Tompkins, 1980) to the experience of time suggests that altered mobility leads to altered time experience. As Newman (1976, p. 273) points out, although physiological effects of immobility have been extensively studied, there has been relatively little research on perceptual effects of immobility and concomitant stress reactions.

Noncompliant behaviour associated with immobilization could be explained in terms of Brehm's (1966) description of psychological reactance in which a person is aware of reduced freedom of choice and reacts in a manner aimed at regaining freedom. When noncompliance is an involuntary result of acting out vivid imagery or dreams, the explanation for the imagery (e.g., nonoptimal stimulation according to Zuckerman's theory) applies to both the perceptual and behavioural changes.

Measurement of time perception

The literature on time estimation is particularly confusing because of use of varied terminology and lack of clarity in the description of methods, with the result that some studies cannot be interpreted. For present purposes, the definitions of Bindra and Waksberg (1956) will be used. They describe three methods that have been used in time estimation research: verbal estimation, production, and reproduction. In both estimation and reproduction methods, the experimenter provides an objective (clock time) interval and asks the subject to estimate verbally or to reproduce objectively the interval or standard. In the production method, by contrast, the interval is stated by the experimenter (e.g., 15 seconds) and the subject is asked to produce this interval objectively, such as by marking off the time with a stopwatch turned face down to give a blind reading.

Much of the literature has used the terms underestimation and overestimation to describe the direction of distortion of time perception from the standard (objective time). For example, if the subject is asked to produce an interval of 15 seconds on a stopwatch (i.e., production method) and the subject marks off more than 15 seconds, this indicates that the subjective temporal units are larger than objective units (internal clock slower than external clock) and hence the subject has *underestimated* the actual time that

has elapsed. Conversely, judgments smaller than the standard provide evidence for *overestimation* of elapsed time. Using the verbal estimation method, by contrast, the opposite interpretation would be made (judgments smaller than the standard would indicate underestimation of elapsed time.

A number of studies of restricted stimulation environments have reported that subjects underestimate elapsed time (Banks & Cappon, 1962; Pollard et al., 1963; Schulman, Ricklin, & Weinstein, 1967). In other words, the internal biological clock was slower than objective time on the external clock. Ludwig (1971, 1975) found that sensory overload and sensory restriction tend to act in opposite ways on time estimation. Excessive stimulation leads to overestimation of elapsed time (internal clock faster than external clock), whereas stimulus restriction is associated with underestimation of elapsed time (internal clock slower than external clock).

The production method of time estimation has been used in the majority of nursing studies reported to date (Fitzpatrick & Donovan, 1978; Newman, 1972, 1976, 1982; Smith, 1975, 1979, 1984; Tompkins, 1980). Some of these studies also used a second method for comparison purposes. The standard used in the above nursing research conducted in laboratory settings has been set at 40 seconds. The procedure for production of the interval is to use a stopwatch with a button which the subject controls to start timing, to stop the hands on the clock and to return to zero.

In an acute care orthopedic setting, where patients may have just experienced trauma or surgery, the method of time estimation needs to be as simple as possible. The method chosen for the present study was the production method, in line with other nursing studies. However, the standard was 15 seconds, as opposed to the 40 second interval used in the laboratory studies of healthy individuals, because the orthopedic sample may be distressed and use of a shorter standard was believed to be less taxing on the patients. Examination of average time estimation scores using the production method in relatively short (2-1/2 hours) laboratory studies of bed-confined healthy subjects (Smith, 1975) reveals that subjects consistently produced judgments larger than the standard and hence underestimated elapsed time, consistent with the results of sensory deprivation studies.

Hypotheses

It was predicted that immobility, social isolation, or the interaction of these two variables would lead to:

1. Increased underestimation of elapsed time (the internal clock will become slower relative to the external clock) in the production of a 15-second interval.

2. Increased reports of perceptual distortions ("hallucination-like experiences") when interviewed.

3. Increased reports of vivid or unusual dreams on interview.

4. Increased noncompliant behaviour (such as trying to remove traction or get out of bed) during hypnagogic states as reported by nurses on interview or recorded in the chart.

Method

The research design

This study used a quasi-experimental factorial design. The three factors in the 2 x 2 x 2 analysis of variance (ANOVA) with repeated measures were: immobility (IM) versus mobility (MO), isolation (IS) versus no isolation (NI), and test (T1) versus retest(T2). The study investigated the effects of naturally occurring immobility and social isolation on perceptual and behavioural changes in hospitalized orthopedic patients.

Immobility was defined as seven or more consecutive days of complete bedrest from admission to the end of the experimental period (T2); mobile patients had four or fewer days of bedrest during this period. The first testing (T1) was done 48-72 hours after admission or surgery to allow for initial adjustment to hospitalization. The second testing (T2) was completed one week after T1.

The definition of social isolation was private room assignment for the majority of the time in the one-week interval between T1 and T2. The patient group that was not isolated was assigned to a semi-private (2-bed) or public (3-4 bed) ward, where one or more of the other beds was occupied. That is, the room was shared by at least two and at most four patients for the majority of the time between the two data collection times. The definition of conditions was arbitrary and reflected relative immobility and isolation because neither variable could be controlled in the hospital settings.

The sample

The patients were selected from the orthopedic wards of two hospitals in a midwestern city. The sample criteria included: 15-65 years old, minimum of grade eight education, no neurological deficit and no sensory defects. All patients admitted were candidates for the study if they met the criteria. Prior to data collection, written informed consent was obtained from each of the 39 patients. An attempt was made to achieve equal cell size for the ANOVA and, after eight months of data collection, only 24 of 39 patients included met the criteria and completed both testings. This gave six patients in each of four groups: immobile-isolated (IM-IS), mobile-isolated (MO-IS), immobile-not isolated (IM-NI), and mobile-not isolated (MO-NI). Data from the additional 15 patients were handled descriptively using frequency counts with no statistical analysis.

The sample included patients with a major orthopedic problem involving the tibia, fibula, femur, pelvis, hip, or spine. Both emergency and elective cases were included in the sample. Unfortunately, these two types of admission were not evenly distributed across cells. In the extreme cases, all patients in the IM-IS group were emergencies (accidents) whereas five of six patients in the MO-NI group were admitted for elective surgery. Type of admission was evenly distributed over the other two cells. Age and sex were also unevenly distributed across cells. Of 24 patients, 71% were male. Most of the immobile patients had been involved in work or motor vehicle accidents. Of these, 92% were male. Ages ranged from 17 to 64 years, with 92% of immobile patients under 40 years and only 17% of mobile patients in that age range. These sampling problems and the small n/cell make the data reported tentative, but nevertheless a basis for future research.

Instruments

Interview. The format for the patient interview was adapted from previous research examining sensory deprivation effects in immobilized orthopedic patients (Bolin, 1974). The questions used are listed in the original report of this study (Stewart, 1977, p. 103). Interviews were tape recorded with the consent of each patient and transcribed verbatim. All interviews were conducted in the patient's room between 9:30 a.m. and 12:30 p.m. Most interviews commenced at approximately 11:00 a.m. with a typical duration of approximately 30 minutes. Content analysis of transcripts was used to determine the frequency of reported perceptual and behavioural changes.

Time estimation task. The production method was used because it was brief, easy to control and it could be administered in a hospital setting without difficulty. Patients were asked to produce an interval of 15 seconds,

without counting, using a stopwatch. Prior to the initiation of the task, the experimenter demonstrated use of the stopwatch. The instructions which followed were given consistently to all patients:

> Without looking at the face of the watch, I'd like you to press the button to start the watch and then press it again when you think 15 seconds have passed. Then hand me the watch without looking at the face of the watch. Try not to count or use any mechanical means to mark off the time.

Nurse reports. Noncompliant behaviour was recorded through a frequency count of nursing reports in the progress notes of patients' charts. Informal, retrospective interviews with nurses were also conducted to provide additional exploratory data on the dependent variables of interest here.

For descriptive purposes, data were obtained from the chart on demographic and treatment information, such as medications. Sensory deficits and neurological status were noted, as well as on-going medical problems or complications (see Stewart, 1977, for details).

Procedure

The experimenter. Because of financial constraints, this study was a single blind study, as opposed to double blind. That is, the nurses on the ward, other than administrative nurses who approved the study, were unaware of the purpose of the study. However, the experimenter, who was a graduate student at the time, was aware of the patient group assignment and research hypotheses.

All negotiations with hospital staff, data collection and coding were carried out by the experimenter. While in hospital, the experimenter wore street clothes and a lab coat. Although she identified herself as both a nurse and a graduate student, she dissociated herself from the patient's clinical care. If a problem unrelated to the interview arose, the experimenter terminated the interview and called a staff member. None of the interviews led to extreme emotional reactions that would necessitate intervention. If such a reaction had occurred, the plan was to terminate the interview, provide therapeutic support, notify the staff and exclude the patient from the study.

Results and Discussion

The statistical analysis (ANOVA) was used for time estimation scores only. Reports of other perceptual changes and noncompliant behaviour were

examined descriptively as frequency data. Chi-square analysis was not used because of the problem of low frequencies per cell.

In support of Hypothesis 1, analysis of time estimation data revealed a three-way interaction effect, $F_{1,20} = 6.91$, $p < .05$, as indicated on Table 2. Subsequent simple effects analysis showed significant changes over time for immobile patients, $F_{1,20} = 8.61$, $p < .01$, and for socially isolated patients, $F_{1,20} = 9.95$, $p < .01$, but not for mobile patients, $F_{1,20} = 1.09$, NS, nor for patients who were not isolated, $F < 1$.

The mean change over time for patients who were both isolated and immobile (Table 1) was also significant on simple effects analysis, $F_{1,20} = 17.76$, $p < .01$. The other three groups had no significant change over time.

Consistent with the interaction effect predicted in Hypothesis 2, the interview data revealed a variety of perceptual distortions that were most frequent and dramatic in patients who were both immobile and isolated. Three patients of 24 experienced either visual or auditory "hallucination-like experiences". Two of these three were in the IM-IS group. An additional four of the 24 patients reported other types of perceptual distortions such as intensification of sounds, perceived movement (kinesthetic imagery) of the bed in the room, and the appearance of a "crooked" room when mobilized to the vertical position.

In the original report of these data (Stewart, 1977) the term "hallucination-like experiences" was used to indicate that the perceptual changes reported did not meet such criteria for hallucinations as apparent reality. The present re-examination of the 1977 data will use the term "imagery" to refer to unusual perceptions and vivid dreams, to be consistent with the language of recent work in this area (Stewart, 1984). This terminology reflects the perspective that altered perceptions in immobile patients stem from a normal adaptation to nonoptimal environments rather than signs of psychopathology.

Overall, 57% of reported distortions were from patients in the IM-IS group, 29% were IM-NI and 14% were MO-IS. No patients in the MO-NI group reported perceptual distortions. Data from the additional 15 patients who were not included in the statistical analysis followed the same pattern. Seven of the 15 reported visual, auditory, tactual or kinesthetic experiences. All of those reporting kinesthetic imagery and 60% of those reporting visual, auditory and tactual imagery were from the IM-IS group. These data suggest an interactive effect of immobilization and social isolation, in support of Hypothesis 2.

Table 1

Mean Time Estimation Scores: Production Method

	n	TEST	RETEST
Isolated			
Immobile	6		
M		5.62	10.90
SD		2.12	5.58
Mobile	6		
M		7.82	8.13
SD		3.05	2.38
Not Isolated			
Immobile	6		
M		9.40	9.32
SD		3.49	2.79
Mobile	6		
M		6.43	7.97
SD		2.29	2.87

Note: In the production method used for the time estimation task, subjects were asked to produce an interval of 15 seconds. Mean values in Table 1 are in seconds relative to the 15-second standard. All mean judgments are smaller than the standard indicating that subjects overestimated elapsed time. The lower the score, the greater the overestimation of elapsed time (internal clock faster than external clock).

The retest period was one week after the initial testing which was conducted 48-72 hours after admission or surgery.

Table 2

Analysis of Variance of Time Estimation

SOURCE	df	MS	F
Between Subjects			
Mobilization (M)	1	17.89	1.10
Isolation (I)	1	.32	< 1
M x I	1	10.55	< 1
Error	20	16.31	
Within Subjects			
Test-Retest (T)	1	37.28	7.92*
M x T	1	8.42	1.79
I x T	1	12.92	2.75
M x I x T	1	32.50	6.91*
Error	20	4.71	

*$p < .05$

Hypothesis 3 stated that immobility, social isolation, or the interaction of these two variables would lead to increased reports of vivid or unusual dreams. Support for the isolation hypothesis was obtained from the original 24 patients. Overall, 71% of reports of unusual or vivid dreams were from the isolated groups. However, some patients in all groups reported unusual ("weird", "wild") or vivid dreams which were similar to the "hallucination-like experiences." Twelve of the 24 patients (50%) reported increased frequency of dreams (not necessarily vivid), while one patient reported a decrease. Seven of the 12 (29% of the total group) reported unusual dreams, with 43% of these being particularly vivid. Only one patient reported recurrent dreams related to the accident leading to admission. Twenty-five percent of patients reported waking up from dreams with a jerk or start; this could be myoclonic jerks associated with sleep disturbance.

Data from the additional 15 patients supported the interaction effect predicted in Hypothesis 3. Forty percent of the increased vivid or unusual dreams were from the IM-IS group. Very few of the 39 patients interviewed could remember the content of their dreams.

Although both voluntary and involuntary noncompliance have been identified in immobile patients (Stewart, 1984), the present study only examined involuntary noncompliant behaviour during hypnagogic states. In support of Hypothesis 4, the two patients of the 24 who demonstrated hypnagogic noncompliance were from the IM-IS group. To lend further support to this hypothesis, two of the additional 15 patients who tried to remove traction or to get out of bed during periods of altered consciousness were both immobile and isolated. Of the four patients cited above, three were in cervical traction which was the most restrictive type of immobility in the study.

Discussion

These data suggest that both perceptual and behavioural consequences may occur when patients are immobilized and socially isolated in a private room. Predicted changes in time perception (Hypothesis 1) were evident through statistical analysis. Hypotheses 2 to 4, which predicted greater imagery, dreams, and noncompliant behaviour for immobile, isolated patients received preliminary support from frequency data.

Although the time estimation data reveal a change in the direction of underestimation of elapsed time, which would suggest support of Hypothesis 1, the absolute mean values reported in Table 2 have a consistent pattern of overestimation of time because all judgments are shorter than the 15-second standard. An alternative to the interpretation of support for Hypothesis 1 (Stewart, 1977), is to interpret these data as evidence for reduced overestimation as opposed to increased underestimation because none of the means fall on the underestimation side of the standard. In terms of environmental stimulation, the underestimation interpretation would support a restricted stimulation hypothesis, with greater restriction over time. The overestimation interpretation, on the other hand, indicates a pattern of sensory overload that is greatest for the IM-IS group, and is reduced over time.

In a laboratory research program on the effects of confinement on duration experience, Smith (1979, p. 139) reports on her earlier findings in which one group overestimated duration relative to another group. However, examination of the original means (Smith, 1975, p. 96) reveals a consistent pattern of judgments longer than the standard or underestimation of elapsed time (the smallest mean was 42.25 for a 40 second standard). These data have relevance to the present study for two reasons. First, the issue of relative versus absolute scores shows that relative scores support one hypothesis while absolute scores support the opposite hypothesis. Secondly, the problem of generalizability of laboratory studies to a hospital

setting is raised. Results of the laboratory simulation of confinement are different from those for hospital confinement. Using the production method, the laboratory confinement led to underestimation of elapsed time (Smith, 1975) consistent with restricted stimulation studies cited earlier. However, hospital confinement in the present study led to overestimation of elapsed time for all patients in both testings, suggesting a sensory overload interpretation. The ANOVA results merely indicate a trend toward greater underestimation over time but no scores actually moved into the absolute range for underestimation.

Because of the problem of absolute versus relative scores, the data presented here (Tables 1 & 2) do not provide clear support for Hypothesis 1. In light of later research with orthopedic patients (Stewart, 1984) in which nonparticipant observation of the environment yielded data in support of an overload hypothesis, it appears that the time estimation data strengthened the overload interpretation. Furthermore, it is questionable whether the laboratory simulations of confinement to bed have adequate external validity to provide a baseline for the hospital experience of immobility. There are numerous differences between the laboratory and clinical studies such as duration of confinement, use of medications, body temperature, and stress levels.

The imagery data (Hypotheses 2 and 3) had the same pattern as the time estimation results. The combination of immobility and social isolation led to both overestimation of elapsed time and increased imagery ("hallucination-like experiences" and vivid or unusual dreams). However, the finding that social isolation (assumed to be restricted environmental stimulation) was associated with vivid and unusual dreams contradicts the overload interpretation of the time estimation data. Either extreme of environmental stimulation could predict perceptual distortions according to Zuckerman's (1969) optimal level of stimulation theory. Whether a private room (defined as social isolation here) represents restricted or excessive stimulation needs to be empirically tested by observational methods.

Findings of hypnagogic noncompliance in immobile, isolated patients must be examined with extreme caution because of the small sample size and low frequencies per cell. However, the clinical significance of these findings is important because the type of noncompliance reported here may interfere with recovery, as the patient is acting against his own self-interest during a period of altered awareness.

Conclusion

Evidence is provided for perceptual and behavioural changes in orthopedic patients who are both immobile and isolated, as predicted. The interaction of these factors (immobility x isolation) was associated with time distortion, imagery, and noncompliant behaviour during periods of altered consciousness. The results must be qualified by two considerations: the small sample size, and a lack of control of confounding variables such as the preponderance of emergency admissions in the immobile, isolated group relative to other groups. With the exception of increased unusual or vivid dreams in the social isolation group, neither immobility nor isolation taken separately predicted the dependent variables.

Results are interpreted to support a stimulus overload hypothesis. However, these preliminary data require substantiation from research that directly examines the stimulation levels in the environment. An earlier interpretation (Stewart, 1977) of time estimation data used relative scores to make a case for stimulus restriction based on a trend toward underestimation of elapsed time after a one week interval in hospital. When absolute scores are examined, however, the data show a clear pattern of overestimation of elapsed time for each group at both testings, which suggests sensory overload. Later studies of immobile patients (Stewart, 1984), which include nonparticipant observation of the environment, also point to an overload interpretation consistent with Zuckerman's (1969 b) optimal level of stimulation theory. These results are the opposite of findings reported by Smith (1975; 1979) in laboratory simulations of short duration confinement of healthy subjects, which challenges the external validity of laboratory research to represent the hospital environment.

The findings presented here provide support for the interrelatedness of the four concepts central to Newman's (1979) model of health. The relationship of time perception to both movement (immobility) and space (private room/social isolation) links three of the concepts, while both perceptual and behavioural changes were associated with the fourth concept, consciousness. Newman (1983, p. 164) defines consciousness as the "informational capacity of the system" that "may be observed in terms of the quantity and quality of responses to stimuli." The perceptual changes reported here may, indeed, be more closely tied to the capacity of the orthopedic patient to process information than to the objective quantity of stimulation in the environment.

The implications for clinical practice stem from the finding that patients who are immobile and isolated may have perceptual and behavioural changes that are related to stimulus overload. Nurses need to assess the environmental and personal variables that contribute to overload and develop

interventions to reduce deleterious consequences. Imagery effects are not necessarily negative effects, but can be frightening for patients, whereas noncompliance has a greater safety risk. Future research should focus on increasing our understanding of the multivariate contributors to stimulus overload in the clinical setting and on testing the effectiveness of nursing interventions that are derived from clinical research data.

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RÉSUMÉ

Malades hospitalisés pour des problèmes orthopédiques: effets de l'immobilisation et de l'isolement sur la perception et le comportement

Cette étude quasi-expérimentale visait à examiner les modifications de la perception du temps, de la visualisation et de la non-compliance hypnagogique chez les malades des services orthopédiques au cours des dix premiers jours d'hospitalisation. La conception de l'étude était la suivante: analyse de variance de mesures répétées 2 (immobile-mobile) x 2 (isolé-non isolé) x 2 (test-retest). Sur les 39 malades interviewés, 24 seulement ont satisfait aux critères d'analyse statistique. Comme prévu, les malades qui étaient à la fois immobiles et isolés ont obtenu des résultats plus élevés sur les mesures de dépendance. Les malades isolés en chambre privée présentaient une incidence accrue de rêves inhabituels et vivides. La notion de temps a été mesurée à l'aide de la méthode de production qui est conforme aux autres études de laboratoire sur l'isolement réalisées par d'autres chercheurs en sciences infirmières. Toutefois, les données obtenues sont contraires aux résultats de recherches antérieures, ce qui semble indiquer qu'il existe un problème quant à la validité externe de la simulation en laboratoire de l'isolement du malade à l'hôpital. Les données relatives à la notion de temps sont interprétées comme preuve de surcharge sensitive dans l'échantillon hospitalier. Cet effet était surtout marqué chez les malades immobiles, isolés et s'est atténué dans le temps ($p<0.5$). Les données sur la visualisation et la non-compliance ont été examinées de manière descriptive à partir de l'analyse du contenu des entrevues. Étant donné le petit échantillon et le problème des variables confondantes, telles que les admissions d'urgence et les admissions prévisibles, les résultats doivent être interprétés avec circonspection. Ces données peuvent être interprétées dans le cadre de la théorie du niveau optimal de stimulation de Zuckerman. Elles appuient les relations réciproques des concepts du modèle de santé de Newman: temps, espace, mouvement et conscience.