

Psychological Interventions in Inpatient Medical Settings: A Brief Review

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Abstract

Background: Behavioral health conditions are prevalent among patients in inpatient medical settings and when not adequately treated contribute to diminished treatment outcomes and quality of life. Substantial evidence has demonstrated the effectiveness of psychological interventions in addressing behavioral health conditions in a range of settings but, to a lesser extent with psychologically-based interventions delivered in inpatient medical settings.

Purpose: The purpose of this paper is to increase attention on psychological interventions being delivered to patients across a broad spectrum of medical specialties in inpatient medical settings to support the implementation of interventions to address increasing patient needs. **Methods:** This selected, brief review of the literature sought to describe published psychologically-based interventions delivered in inpatient medical settings. A search for studies catalogued on PubMed from 2007 to 2016 was examined and studies were included in the review if they were delivered within inpatient medical settings. Two reviewers independently assessed relevant studies for criteria.

Results: A total of ten articles met the inclusion criteria with interventions targeting outcomes across four primary domains: 1) pain and fatigue; 2) cognition; 3) affective/emotional and; 4) self-harm. Several articles support interventions grounded in Cognitive-Behavioral Therapy and brief psychological interventions. Most studies reported favorable outcomes for the interventions relative to controls. **Conclusions:** Psychologically-based interventions, especially those that integrate components of cognitive-behavioral therapy and a multidisciplinary approach, can be implemented in inpatient medical settings and may promote improved patient outcomes. However, the quality of this evidence requires formal assessment, requiring more comprehensive reviews are needed to replicate findings and clarify effectiveness of interventions.

Keywords: Hospital; Interventions; Psychological; Behavioral; Medical; Inpatient.



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1. Introduction

One of the most pressing challenges for healthcare providers in acute medical settings involve addressing behavioral health conditions and concerns. Behavioral health conditions (BH) – whether psychiatric or substance use disorders – are prevalent and comprise an estimated 30% to 50% of inpatient admissions [1-3]. When BH conditions are not adequately addressed, affected patients have poorer quality of life and social performance, longer hospitalizations and higher hospital readmission rates, heightened vulnerability for treatment nonadherence, are more likely to undergo more procedures and incur greater hospital costs when compared to patients without BC conditions [4-6]. Accordingly, healthcare organizations are increasingly emphasizing the need for increased focus on treating BH conditions in inpatient medical settings as a priority to improve patient outcomes and safety [7].

Prevalence rates of BH conditions in inpatient medical settings vary by patient populations (e.g. developmental stage, medical condition), but the most common BH conditions include those affecting mood, cognition, substance use, and suicidal ideation; often within the context of illness trajectory, response to treatments, coping and adjustment [1]. Treatment approaches for BH conditions often include either a combination of pharmacological treatment and psychological interventions, or either modality alone. There are instances in which pharmacological approaches are essential to stabilize and adequately address BC conditions, however, there is some evidence that

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reliance on pharmacologic treatments alone is often insufficient to adequately address many conditions. For example, recent investigations have found that only one-third of patients suffering from depression have optimal responses to antidepressants [8, 9] and many patients prefer psychological interventions over pharmacological interventions by almost three to one [10]. Moreover, treatment approaches that rely solely on pharmacologic agents to address behavioral health conditions and needs are insufficient as it ignores the influence of coping, adjustment and other psychosocial factors that contribute to disease trajectory, health behaviors and other aspects of functioning. Accordingly, there is a need to strengthen consideration of evidence supported treatment approaches that extend beyond a singular focus on pharmacologic strategies.

The provision of psychological interventions is cost-effective and result in health care cost savings [11]. Psychological interventions can include a range of treatments that are both behavioral and psychotherapeutic in approach that designed to alleviate psychological distress and symptomatic behaviors, modify maladaptive cognitions and behaviors, improve self-management and enhance functioning. Common elements of psychological interventions include psychoeducation, cognitive and behavioral skills training and psychotherapy or counseling [12]. Psychological interventions have demonstrated efficacy and been shown to improve value and reduce cost of healthcare by improving health outcomes [13, 14]. A review of 295 randomized controlled trials of psychological interventions found evidence supporting the utility of psychological interventions in healthcare settings [15].

Brief psychological interventions in medical settings - targeted interventions that are focused on achieving immediate goals - are delivered by a range of healthcare providers. Brief psychological interventions have shown efficacy and cost-effectiveness in reducing depressive symptoms among medical populations and, in some cases, comparable to antidepressant medications [16-19]. In a study in which 121 patients with acute coronary syndrome were randomized to an experimental group and control group, patients in the experimental group who underwent a brief psychological intervention consisting of two psychotherapy sessions during hospitalization and a follow-up session one month after discharge demonstrated significant reductions in anxiety, depression and illness cognitions – all of which contribute to treatment adherence - compared to the control group [20]. Moreover, brief psychological interventions have been identified as having the potential to be scalable as they can be modified based on patient needs and can integrate innovative strategies in delivery [World Health Organization, Scalable Psychological Interventions for People in Communities Affected by Adversity]. Taken together, the implications of these findings underscore a critical need for increased knowledge on the use of psychological interventions in inpatient medical settings.

Despite increasing emphasis on behavioral health care in acute medical settings and evidence supporting the utility of brief psychological interventions in these settings, most studies to date have focused on psychological interventions in primary care outpatient settings, psychiatric inpatient hospital settings, the use of pharmacologic agents or specific populations and medical conditions (e.g. cardiomyopathy), limiting what is known about the utility of the intervention in broader, more medically diverse populations in acute medical settings.

As the recognition to address behavioral health conditions in acute medical settings and promote self-management of disease has grown in recent years, there is a need to identify and summarize non-pharmacological evidence-based interventions. An analysis of aggregated data may help inform efforts to increase capacity to attend to and address behavioral health needs in an era where population-based care and management is emphasized. Thus, the objective of this selected review of the literature was to describe psychological interventions currently being used in inpatient medical settings and the populations on which they are delivered and their effectiveness.

2. Methods of the Review

Studies were identified using two methods. First, a literature search was conducted using the electronic database PubMed database (2007-2017) using the following keyword search terms: (i) preoperative anxiety or perioperative anxiety; (ii) behavioral interventions or cognitive interventions; (iii) depression treatments or interventions or mental health treatments; (iv) psychotherapy interventions, behavior or cognitive therapy; and (v) hospital setting or critical care or inpatient or acute settings. Second, we further identified papers to review by cross-reference studies.

The following inclusion and exclusion criteria for review were: (1) Articles written in English, published within the last ten years (between 2007-2017); (2) Interventions that were delivered or initiated in inpatient medical settings, and studies focused on adult participants; (3) The exclusion criteria were: narrative reviews, case-control studies, letters, editorials, case-series, meta-analyses and manuscripts that included studies that tested models of care, studies conducted in psychiatric inpatient hospitals or initiated in outpatient settings and studies that did not use behavioral or psychological interventions. The initial literature search revealed 84 articles, which were screened for eligibility based on title and article abstracts. The list was reduced to a final selection of 30 articles. After further review by two independent coders for eligibility, nine articles met criteria. Through cross-reference of eligible studies, an additional study was included, resulting in a total of ten studies in the final analysis. The aim of this methodology was to describe the interventions and address concerns for future investigation.

3. Results

A total of ten studies were included in the final review with key characteristics summarized in Table 1, including interventions, sample size country in which the study took place, sample size, study objectives, study design, setting in which intervention was delivered, description of intervention, measures, major study findings and study strengths and limitations. Papers were categorized based on targeted intervention outcomes across four primary domains: 1) pain and fatigue; 2) cognition; 3) affective/emotional and; 4) self-harm. The number of

participants in each study ranged from 11 to 207. Six studies were conducted in the United States, with one conducted in Germany, one in the Netherlands, one in China, one in Italy and one in Spain.

Considerable variation in study methodology was observed. Three studies relied on a randomized control trial [19], [21-23]; two used a non-randomized pre/post, two-group design [20], [24-26] and two studies used single group descriptive [27, 28]. Five studies utilized cognitive behavioral therapy (CBT) interventions or elements of CBT [20-23], [28], and two studies relied on virtual reality interventions [24], [27].

3.1. Pain and Fatigue

Unrelieved pain is a global concern and one of the most common complaints among patients in inpatient medical settings. Described by the International Association for the Study of Pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” pain is subjective, contributes to psychiatric distress and disability and requires a treatment from multiple modalities to adequately manage (IASP website). There is strong evidence for the effectiveness of psychological interventions in managing chronic pain and increasing evidence on the utility of brief interventions to address pain. Pain experienced during hospitalization predicts psychological adjustment at both one-month post discharge and up to two years follow-up [29].

A recent pilot study comprised of 57 patients receiving care at an outpatient pain clinic demonstrated significantly reduced pain catastrophizing – a psychological factor that increases pain intensity and chronicity - two weeks and four weeks after participating in a single session class [30]. A recent systematic review of randomized controlled trials of psychological interventions in the management of postsurgical pain found support of the utility of psychological interventions that were based on Cognitive-Behavioral Therapy in reducing chronic postsurgical pain and disability [31].

Using a within-subjects design, Faber, *et al.* [24] conducted a study of 36 burn survivors from ages 8-57 in the Netherlands to determine if repeated virtual reality reduced pain during wound care. Patients received one baseline debridement session without virtual reality (the control condition) with up to seven virtual reality treatments during wound debridement sessions. All patients continued to receive pharmacologic analgesics. Using visual analog thermometer as the dependent variable, results showed that virtual reality reduced the amount of pain reported compared to worst pain intensity during debridement without virtual reality, particularly when used over multiple debridement sessions. Notably, pain ratings were not statistically significant beyond three days.

As previously noted, there is compelling evidence on the effectiveness of interventions based on Cognitive-Behavioral Therapy for a range of concerns, including pain and disability. Linden, *et al.* [22] conducted a randomized control trial in Germany to determine the effectiveness of cognitive behavioral group therapy in improving pain tolerance and disability apart from the effects of somatization and additional aspects of multimodal orthopedic inpatient care (e.g. physical therapy, patient education or motivation to exercise) among patients with at least six months of chronic back pain. Fifty-three adult patients in an orthopedic inpatient rehabilitation unit were randomly assigned to six sessions of Cognitive-Behavioral Group Therapy for Back Pain (CBT-BP) and 50 patients who served as a control group and received occupational therapy sessions. would improve pain tolerance and disability apart from somatization. Results demonstrated significant improvements in overtime across a range of outcomes with significant interactions between the treatment group and pain intensity and fear avoidance beliefs. The study authors conclude that the treatment effect of CBT-BP is specific and adds to an already compelling literature on the effectiveness of psychological interventions in pain management.

Complaints of fatigue are also common among patients in inpatient medical settings but remains untreated, especially among those with cancer and behavioral health conditions. In the United States, Fredenburg and Silverman [20] conducted a mixed-method pilot study of eleven adults in a bone marrow transplant unit to determine if and how Cognitive-Behavioral Music Therapy decreased fatigue. Participants were randomly assigned to an experimental or wait-list control conditions, all of whom completed a questionnaire assessing five aspects of fatigue at pre- and post-test. Seven patients in the experimental group underwent five sessions of Cognitive-Behavioral Music Therapy along with a semi-structured interview prior to discharge while patients in the control group comprised of four adults did not receive psychological intervention. Quantitative analysis did not reveal significant between group differences on fatigue; however, patients in the experimental arm demonstrated decreased scores in mean fatigue scores both subjectively and objectively from pre-to post-test while patients in the control had increased in mean fatigue scores from pre-to post-test. Using qualitative and quantitative data, there was support that the CBMT: 1) cognitively influenced fatigue by increasing motivation and self-efficacy, 2) affectively influenced fatigue by promoting relaxation and restful states, and 3) represented a meaningful holistic service. Although the study was limited by sample size, the authors conclude that results strengthen prior studies suggesting that psychological interventions offer promise in reducing fatigue among cancer patients during hospitalization [32].

3.2. Cognition

Some investigators have observed an associated between hospitalization and cognitive decline, positing a range of factors that may mediate the association such as depression, delirium, stress and medication, underscoring the need for prevention and early identification [33]. Delirium, characterized as a multifactorial neurobehavioral syndrome is associated with decrements in functioning and increased mortality. In China, Guo and Fan evaluated the effectiveness of a preoperative, multidisciplinary intervention developed to prevent acute postoperative delirium on both incidence and severity of patients in intensive care after surgery on 122 patients recruited transferred from cardiac or abdominal surgery. Using standardized protocols to manage risk factors for delirium, the intervention

included education of nursing staff, maintenance of a safe environment, the provision of social support, behavioral efforts to improve sleep quality and systematic cognitive caring. Using a measure of delirium, patients were assessed face-to-face and monitored for symptoms of delirium after surgery at 2,4,8, 16 and 24 hours after surgery. Patients in the experimental group demonstrated lower scores on the delirium measure relative to the control group at the same time points, suggesting the utility of a systematic, multicomponent preoperative intervention on early prevention.

Raggi, *et al.* [28] conducted a study on the clinical effectiveness of a comprehensive cognitive rehabilitation program for fifty patients with varying severity of dementia in a long-term specialized unit who were already started on pharmacological therapies before the intervention. Reporting data during a 17-month period, the intervention included individualized cognitive-behavioral and motor strategies and reality orientation therapy to improve cognitive, functional and psychopathological status. Results supported improvements in both cognitive and functional outcomes, including apathy, agitation. Participants in all stages of dementia development demonstrated improvement. The study authors speculated that the cognitive portion of the intervention likely increased motivation and self-esteem, which may have also contributed to improvements. They recommended that approaches that integrate pharmacological, cognitive-behavioral, motor rehabilitation along with caregiver's support across varying professional disciplines are needed to optimize outcomes.

To determine the effectiveness of a cognitive rehabilitation for early post-surgical inpatients with brain tumors, Zucchella, *et al.* [26] used a randomized, controlled trial of 109 neuro-oncological inpatients, with 58 randomized assigned to a rehabilitation group or control group. Providing 16 one-hour individual sessions of therapist-guided cognitive training over four weeks integrating metacognitive training and computer exercises. Using a neuropsychological battery at baseline and after four weeks, results demonstrated patients in the rehabilitation group to have significant improvements in cognitive functions, particularly visual attention and verbal memory. The control group did experience slight improvements in cognitive performances but they were not statistically significant.

3.3. Affective/Emotional

Accumulating evidence supports the use of brief psychological interventions in specialty medical settings, especially those delivered in integrated primary settings, in reducing affective distress, bolstering psychosocial strengths and improving one's quality of life [34]. Consequently, there has been increased attention on how to adapt these interventions across medical specialties and populations within inpatient medical settings both for patients and their families. Recognizing that parents of infants in the NICU are vulnerable to experiencing affective distress, Bernard, *et al.* [21] sought to examine the effectiveness of a brief cognitive-behavioral intervention on symptoms of depression and trauma among mothers whose infants were in the NICU using a randomized controlled design in a pilot study. The control group (n = 25) received standard care that included contact with nurses, physicians and social workers while the intervention group (n = 31) received three 45-55 minute sessions of Cognitive-Behavioral Therapy tailored for the needs of NICU parents. Participants completed self-report measures assessing distress at baseline and one month post-discharge of their infant. Results demonstrated elevated levels of distress among study participants at baseline and follow-up. At follow-up, reductions in depressive symptoms for participants in the experimental group was observed. Trauma symptoms among participants in both groups were similar although those in the experimental group decreased but not significantly. psychotherapist after one month of the discharge of their infants from the hospital. The authors note that the study was underpowered to detect small to moderate effect sizes which may have contributing to findings.

With a total sample of 207 acute injured hospitalized trauma survivors with high levels of PTSD symptoms, Zatzick, *et al.* [23] examined the feasibility and effectiveness of implementing an intervention aimed at reducing symptoms of PTSD and improving functioning. Participants were randomized to a stepped combined, care management, psychopharmacology and cognitive-behavioral intervention (n = 104) or usual care control condition (n = 103) and assessed once during hospital admission and reassessed at one-, three-, six-, nine-, and twelve – months post-discharge either in an outpatient surgery clinic or by telephone. Patients in the intervention condition received mental health care over a twelve-month time span after their injury that could be delivered in surgical inpatient wards, outpatient surgery clinics and by phone. Participants in the intervention condition received care management, pharmacotherapy and components of cognitive-behavioral therapy and were provided opportunities to discuss treatment preferences with a collaborative care time. Results demonstrated that participants in the intervention condition demonstrated clinically and statistically significant reduced symptoms of PTSD and improved functioning relative to controls over the course of twelve months.

Findings from the positive psychology literature have demonstrated the importance of positive experiences and emotions in strengthening internal psychological resources and adaptive coping in adverse circumstances. Building upon this knowledge, Baños and colleagues conducted a pilot study in Spain to induce positive mood using virtual reality (VR), which is increasingly being used in the treatments of psychological interventions [27]. Using a single-group descriptive design, the authors conducted a pilot study to explore the feasibility of using VR to bolster positive emotions in adult inpatients with metastatic cancer. With a final sample of 19 participants, all received four 30-minute sessions of virtual reality in one week that guided them through virtual environments designed to evoke feelings of joy and relaxation. Participants answered open-ended questions at the end of each session. Results showed that after each session, participants demonstrated decreases in their intensity of sadness and anxiety and increases in joy and relaxation but statistically significant differences were only observed in the second session. Overall, participants reported an increase in positive emotions and decrease in negative emotions. Study authors

conclude that results, although preliminary, suggest that implementation of virtual-reality based interventions in inpatient medical settings are feasible.

3.4. Self-Harm

Suicide and intentional self-harm behaviors are a public health concern, among the most frequent reasons for hospital admission and are often repeated [35]. Despite support on the effectiveness of brief psychological interventions in medical settings, they are not considered standard of care and treatments continue to be guided by a biomedical focus [36, 37]. The delivery of brief psychological interventions in inpatient medical settings to reduce self-harm are particularly important for this population the role of psychological risk and protective factors in self-harm behaviors and that a low percentage of patients will follow-up after discharge and even fewer will terminate treatment in the first three months after a suicide attempt – placing them at increased risk for additional engagement in self-harm.

O'Connor et al sought to establish the feasibility and acceptability of a “Teachable Moment Brief Intervention” which was delivered to patients admitted to a Level 1 trauma center after suicide attempt [19]. Building upon research demonstrating the influence of cueing events in interpretation and an opportunity to increase motivation to modify high risk health behaviors, along with elements of Dialectical Behavioral Therapy and the Collaborative Assessment and Management of Suicidality, the intervention aimed to use the time following a suicide attempt to facilitate change by establishing rapport, identification of factors contributing to suicide attempt, crisis planning and outpatient mental health planning. Using information provided by the first ten patients, an intervention manual and research design was developed that was refined on the next ten patients. Thirty patients were randomized to a pre-post design and given a teachable moment brief intervention along with usual care of usual care only and assessed prior to randomization and one month later. Patients rated the intervention as good to great on client satisfaction items and statistical analysis demonstrated significant group time interventions for readiness to change and reasons for living with patients in the intervention exhibiting improvements. Although a pilot study, these preliminary data support the increasing empirical evidence on the utility of brief suicide-specific interventions (comprised of 1-4 sessions), such as Dialectical Behavioral Therapy, Cognitive Therapy for Suicide Prevention and the Collaborative Assessment and Management of Suicidality. These interventions have the potential to offer effective care for patients at heightened risk for intentional self-harm by improving insight, identifying reasons for living and promoting readiness to address their problems [19], [38].

4. Discussion

Drawing from a selected literature, the studies reviewed provide insight into a cadre of interventions being piloted and implemented across a range medical populations and behavioral health concerns in inpatient medical settings. It is exciting that findings suggest that treatment approaches that focus or integrate psychologically-based interventions have a positive impact across a range of complex patient needs in inpatient medical settings. Despite some overlap, targeted outcomes from the psychological interventions covered five domains - fatigue, pain and disability, cognitive, affective/emotional and self-harm. Most studies reviewed reported statistical significant in outcomes and those did not reach statistical significant demonstrated positive trends in targeted outcomes. Similar to prior findings on psychological interventions among medical populations in outpatient settings, five of the ten studies reviewed reported improved outcomes using interventions that included sessions ranging from 1-6 sessions. [30] [39, 40]. Although the components and techniques differed across studies, interventions that incorporated elements of cognitive-behavioral therapy demonstrated improved outcomes - a finding consistent with prior investigations supporting the implementation of psychological interventions in medical settings [34, 41]. Taken together, findings from this review support the feasibility of delivery psychological interventions to inpatient medical settings.

The findings from this review should be interpreted in light of its limitations. First, due to classification, it is likely that some studies were not identified due to the key words used. Second, the review was observational in nature and studies reviewed were not assessed for methodological quality or risk of bias as the objective of the review was to provide a description of interventions being used. Some studies were comprised of small sample sizes. Future reviews would benefit from assessment of risk of bias and methodological quality. In addition, longitudinal studies would allow exploration for the understanding effect sizes of results and in identifying the moderating and mediating role of psychosocial and medical factors in explaining the association between patient psychological distress and outcomes.

5. Conclusions

Addressing psychological factors is a key component in treating BH conditions. This selected studies reviewed offer insights into psychological interventions being delivered in inpatient medical settings and suggests that this modality is feasible, can be successfully implemented within this setting, and offers clinical benefits. If we are to advance health promotion and maintenance of at a population and individual level, psychological interventions must be available in medical care settings where the stigma of mental health is diminished, treatment is accessible and coordination of treatment can be improved through a multidisciplinary approach. Although the findings are not robust, the research and examples presented may inform future implementation strategies, frameworks and evidence-based practices.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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Study	Setting	Study Objective	Study Design	Sample Size	Intervention	Measures	Findings	Strengths and Limitations
Frederburg, H. et al., 2014 United States	Transplant Unit	Determine if and how cognitive-behavioral music therapy reduces fatigue in a bone marrow transplant unit on five aspects of patient fatigue	Pilot, convergent parallel mixed-method	N = 11 Adults (Experimental Group, N = 7; Age [M, SD] = 46.14; 15.46, Days in Hospital [M, SD] = 21.71, 15.91); (Control Group (N = 4; Age [M, SD] = 53.2 (7.14); Days in Hospital [M, SD] = 9.75 (3.77)	Experimental group: Cognitive-Behavioral Music Therapy (mean number of session = 5, SD = 3.65) Control group - no treatment	Experimental participants completed semi-structured interview prior to discharge, all participants completed Multidimensional Fatigue Inventory pre- and post discharge (five types of fatigue: general, physical, reduced activity, reduced motivation, mental fatigue)	No significant differences between-group differences on fatigue using quantitative data. Experimental participants demonstrated decreases in mean fatigue scores from pre- to posttest. Control participants had increases in mean fatigue scores from pre- to posttest. CBMT: 1) cognitively influenced fatigue by increasing motivation and self-efficacy, 2) affectively influenced fatigue by promoting relaxation and restful states, and 3) represented a meaningful holistic service	Strengths = study design, brief intervention Limitations = Small sample size, potential response bias, data collection period was brief, many patients declined to enroll due to fatigue; intervention not offered to all patients on the unit
Faber, A.W. et al., 2013 Netherlands	Burn Unit	Explored whether immersive virtual reality (VR) continues to reduce pain by distraction during more than one wound care session per patient	Within-subject design, compared pain during conventional treatment to pain during 1,2,3 and up to 7 separate VR wound care sessions per patient	N = 36 aged 8-57 years (mean age 27.7), average of 8.4% total body surface area burned (ranged .25 to 25.5 TBSA)	36 consecutive patients treated with VR therapy (VR Technology) during first 14 days of admission. Immersive VR limited to period before initial surgery. Normal analgesic regimen continued	Visual Analogue Thermometer	VR reduced the amount of pain reported on more than one dressing change/wound debridement session per patient.	Strengths = largest sample of VR wound care to date, study design; Limitations = exclusion of patients with psychiatric disorders, preliminary evidence, only 83% received VR for 2 or more treatments and only 47% received VR three or more sessions
Ying, G et al., 2016 China	ICU	Evaluate the effect of a preoperative, multidisciplinary intervention program for prevention of acute postoperative delirium on intensity and severity	Control Clinical Trial Design. Experimental with simultaneous control and experimental group	N = 122 (usual care, N = 63; intervention, N = 63) recruited from cardiac surgery and abdominal surgery who were transferred to ICU after surgery	Standardized protocols to manage delirium risk: education of nursing staff, systematic cognitive training, maintain safe environment, social support and improve sleep quality	Delirium Decton Score Collected Face-to-Face postoperative anesthetic awake status on point of 2,4,8, 16 and 24 hours by nurses	At same time points, Delirium Decton Scores in the intervention cohort were less than scores of patients in the control group. The severity degree of delirium for patients was less in the intervention group within 24 hours than in usual care cohort	Strengths = prospective design Limitations = Exclusion of patients with history of psychiatric disorders, small sample, inability to delivery intervention using blind manner

Linden, M. et al., 2014 Germany	Orthopedic Inpatient Rehabilitation Unit	Determine whether Cognitive Behavioral Group Therapy is effective in improving pain tolerance and disability apart from somatization, anxiety and depression	Randomized Control Trial	N = 103 (age [M, SD] = 50.8 (6,9); Intervnetion = 53 (age [M, SD] = 50.4 (6,9); Control N = 50 (age [M, SD] = 49.7 (7,1))	3 90 minute CBT-BP (cognitive behavior group therapy for back pain) group sessions per week for 21 days	Fear Avoidance Beliefs Questionnaire , Visual Analogue Scale Pain, Pain Disability Index, Symptom Checklist (SCL-90-R)	CBT-BT effectively improved pain experience, and functional coping and attitudes about back pain and fear and avoidance behavior. Significantly improvement in pain in the intervention group than control group using the VAS-pain. No significant treatment related improvements in the SCL-90-R or in disability	inability to conduct study blindly,
O'Connor et. al, 2015 United States	Level 1 Trauma Center	Establish feasibility and acceptability of a brief intervention for medically admitted suicide attempt survivors and to examine trajectories across 1 month on outcomes of interest between patients who received the brief intervention and those who did not	Randomized	N = 50 (N = 10, usual care; N = 10, refinement of intervention; N = 30 randomized for intervention plus usual care or usual care only)	1 session of Teachable Moment Brief Intervention	Scale for Suicide Ideation, Motivation to change, satisfaction ratings, demographic survey	Delivery of brief intervention feasible and acceptable in Level 1 trauma center. Patients rated intervention as "good to "great" on client satisfaction. Significant interaction effects across the 1-month time period showed greater positive, linear trends for three of the four subscales on readiness to change and reasons for living among patients who received the brief intervention. Usual care group had non-significant reduction in suicidal ideation across 1 month.	Strengths = first study to examine the acceptability and feasibility of a brief intervention delivered to suicide attempt survivors currently hospitalized in a medical/surgical floor; Limitations = only one clinician delivered the intervention, small sample so unable to determine efficacy, only one follow-up assessment
Bernard et al., 2011 United States	Delivered to mothers of infants delivered or transferred to the NICU within 72 hours of delivery and expected to survive	Determine the effectiveness of a brief cognitive behavioral intervention in reducing traumatic and depressive symptoms in mothers	Randomized Control Trial	N = 56 ([n = 25, control; n = 31 = intervention]. Age (M, SD) = control = 32,5,6; intervention; 33,3, 4,2; drop-out = 27,3, 9,5)	Intervention group received three 45-55 minute CBT sessions over the course of approx 2 weeks	Stanford Acute Stress Reaction Questions, Davidson Trauma Scale, Beck Depression Inventory 2nd edition	Mothers experienced high levels of traumatic and depressive symptoms at baseline and 1 month follow-up. At follow-up there was a trend for mothers in the intervention group to report lower levels of depression but levels of traumatic symptoms were similar for both groups.	

Banos et al., 2011 Spain	Inpatient hospital	Present data on the feasibility and possible benefits of a psychological intervention that uses virtual reality to induce positive emotions on adults hospitalized with metastatic cancer	Single group descriptive study	N = 19 (age range 29-85 years, M = 60.9; SD = 14.54)	4 Virtual Reality-based psychological sessions each lasting between 30 minutes to one hour, delivered across one week (8 patients received fewer .	Visual Analog Scale - Mood, Visual Analog Scale - Physical Discomfort, Visual Analog Scale - Satisfaction, Satisfaction with Intervention Scale, Open-ended questions	Rated by patients as pleasant, somewhat useful, many patients reported feeling better after the sessions, statistical significance on mood changes reached with the second and fourth sessions. VR-based positive mood induction feasible to implement in hospital. Qualitative reports more positive than quantitative reports	Limitations = small sample size with mostly qualitative and descriptive data, no control group, reliance of visual analog scales for measurement, limited intervention phase
Raggi et al., 2007 Italy	Rehabilitation Specialized Unit, Hospital Setting	Present data from 17 month cognitive rehabilitation in patients with Alzheimer's Disease (AD) using a combination of pharmacological therapy, cognitive behavioral motor rehabilitation, caregivers support, the Reality Orientation Therapy, Computerized cognitive training	Single group descriptive study	N = 50 with probable AD (mean age = 76 years (SD = 6.33)		Mini-Mental Status, Activey of Daily Living, Neukropsychiatry Inventory, Clinical Dementia Rating Scale, Culmultative Illness Scale, Tinetti Scale	Significant effect of comprehensive treatment program found on cognitive and functional outcomes and significant improvements on psychological and behavioral disturbances	
Zucchella et al. 2013	Neruorehabilitation Unit	Test effectiveness of early cognitive rehabilitation treatment for inpatients with primary brain tumors, pre and post test (4 weeks)	Longitudinal	N = 109 (n = 58 randomly assigned to a rehabilitation group or control group)	Rehabilitation consisted of 16 one-hour individual sessions of therapist-guided cognitive training across 4 weeks, combining computer exercises and metacognitive training. Patients in the control group received usual care without cognitive training	MMSE, Digit Span, Corsi's Test for verbal and spatial immediate memory span, Rey Auditory Verbal Learning Test and logical memory for verbal memory, immediate and delayed recall, Raven's Coloured Progressive Matrices 47, Frontal Assessment Battery, Train Making Test A, Trail Making Test B, Attenitive Matrices, Rey-Osterrieth complex figure copoy, Esame Neuropsicologico per l'Afasia,	Patients in the rehabilitation group showed significant improvement of cognitive functioning, especially visual attention and verbal memory. The control group demonstrated a slight, although not statistically relevant, enhancement of cognitive performances	

<p>Zatzick et al., 2014 United States</p>	<p>Trauma surgery unit</p>	<p>Test effectiveness of a stepped care intervention model targeting posttraumatic stress disorder (PTSD) symptoms after acute injury among patients with high levels of PTSD symptoms</p>	<p>Randomized, longitudinal, follow-up at six-, nine-, and 12 months post-injury assessments</p>	<p>N = 207 (n = 104, intervention; n = 103, usual care) patients who screened positive on PTSD symptoms twice, once on surgical inpatient and early days/weeks after hospital discharge</p>	<p>Patients received care during inpatient hospitalization and from trauma center-based mental health team over the course of 12 months post-injury. Intervention included care management, pharmacotherapy, CBT components</p>	<p>PTSD Checklist Civilian Version, Clinician-Administered PTSD Scale, Patient Health Questionnaire, Alcohol Use Disorders Identification Test-Consumption Items, Medical Outcomes Study Short Form 36 Physical Component Summary, Interview</p>	<p>Intervention patients demonstrated significant improvements in physical function over the course of the year. over the course of the year after injury, intervention patients had significant reduction in PTSD symptoms relative to control. Clinically and statistically significant reductions in PTSD symptoms at six-, nine-, and 12-month post-injury assessments</p>	
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