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Recent discoveries in preventing mental impairments and ICU staff interventions in post-intensive care syndrome

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Abstract

Introduction

Mental impairments such as post-traumatic stress disorder, depression, and anxiety are alarming problems in the ICU-survivors population because of the higher survival rate due to medical, scientific and technological progress. There are more and more patients facing long-term emotional consequences of critical illness. The main purpose of this review is to describe recent research about possible interventions and methods of prevention of mental impairments after an ICU stay made since 2015.

Review methods

The review was made using online databases such as PubMed and Google Scholar.

Brief description of the state of knowledge

Recent trials included in our review suggest that the sedation strategy has no significant impact on mental impairments in ICU survivors. ICU diaries seem to be a well-accepted and cheap method of prevention of mental disorders after critical illness but their universal usefulness is difficult to determine because variable factors like hospital and country levels influence the trials on patients. Nurse-led intervention programs, virtual reality and antioxidants described in recent studies also show no significant decrease in PTS symptoms in ICU survivors. Initial effects of mobile apps-based psychoeducational programs are comparable to therapist-led programs.

Summary

We did not find any evidence-based revolutionary method of prevention or intervention to help improve the mental health of ICU survivors. We think that the growing seriousness of this problem will lead to further research to cope with this phenomenon.

Keywords: Intensive Care Units, Stress Disorders, Post-Traumatic, Depression, Critical Illness, Anxiety

Introduction

The intensive care unit (ICU) is a specialist department of the hospital that provides treatment and monitoring for patients who are seriously ill and in need of both intensive monitoring by nurses and life-supporting interventions. The definition of intensive care is a “multidisciplinary and interprofessional specialty dedicated to the comprehensive management of patients having, or at risk of developing acute, life-threatening organ dysfunction”. It is reserved usually for patients with potential or established organ failure. The most common organ to support is the lung but facilities should also exist to diagnose, prevent, and treat other organ dysfunctions [1].

Post-traumatic stress disorder (PTSD) is a disorder that could be developed by people who have experienced a shocking, scary, or dangerous event. Patients may suffer from re-experiencing traumatic events even with physical symptoms like shortness of breath or chest pain, stress, relapsing memories or dreams related to the event. Trying to avoid objects, situations and people related to traumatic experiences, problems with concentration, and feeling tense can also be part of PTSD [2].

Post-intensive care syndrome (PICS) is a constellation of newly developed or worsened existing physical, psychiatric, and cognitive disability that patients after ICU suffer from. PICS is a new term officially adopted in 2012 to raise awareness and improve education about

the long-term consequences of critical illness for patients and their families (PICS-F). When it comes to PICS-F relatives of ICU patients suffer from mental problems such as anxiety, depression, PTSD and complicated grief [3].

Review methods

The review was made using electronic databases such as PubMed and Google Scholar using the terms “ICU”, “PTSD”, “mental impairments”, “diaries” “sedation” and its combinations. We screened papers from 2015 or newer. We included clinical trials and randomized clinical trials in our review.

State of knowledge

Epidemiology

From 17% to 44% of ICU survivors suffer from psychiatric symptoms. There are few researches which examines the relationship between psychiatric impairments and quality of life after ICU discharge. One clinical trial shows that it seems patients after ICU delirium screened positively for all of the following: PTSD, depression and anxiety have poorer quality of life than patients with 1-2 or no positive screen [4]. Analysis of a big randomized clinical trial in the pediatric population showed that screening positively for PTSD after a pediatric intensive care unit (PICU) stay was associated with lower income in the family’s residential zip code, renal dysfunction and significant pain during hospitalization. Children screened positively for PTSD experienced a decrease in cognitive function and health-related quality of life [5]. Significantly, ICU stay is a factor that separately declines health-related quality of life [6,7,8].

Sedation and mental impairments

Post hoc analysis of the DACAPO study was comparing how various sedation strategies influence psychiatric disorders and health-related quality of life after ICU. Analgo-sedation was not significantly associated with physically or mentally impaired quality of life. Although higher cumulative doses of ketamine increased the risk of psychiatric symptoms in acute respiratory distress syndrome (ARDS) survivors up to 6 months after ICU discharge. Currently, it is unknown why ketamine increased the risk of PTSD and depression symptoms in the short follow-up outcome and not in the long-term follow-up [9]. Authors of the NONSEDA randomized trial analysis showed that there is no difference in the number of patients positive-assessed for PTSD, depression and anxiety between the sedated and the non-

sedated patient in their first 24 hours of mechanical ventilation 3 months after ICU discharge. It is worth noticing that in this study only 2 of all 95 tested patients were diagnosed with PTSD. Authors suggested that this phenomenon is the result of a few local factors: there was a satisfying nurse-to-patient ratio with a possibility to call for extra help if a patient was uncomfortable, ICU staff was experienced with the treatment of non-sedated patients, there was no restriction in relatives visiting and physical restraints were never used. There was a similar dose of opioids administered in both groups but too low to cause sedation in the non-sedated group [10].

ICU diaries

Danish multicenter randomized controlled trial (RCT) showed that family-authored diaries decreased the occurrence of PTSD symptoms score in ICU survivors by 11.2% and 26.3% in their relatives. The diary did not significantly reduce the risk of posttraumatic stress, anxiety, or depression in patients but it seemed to be beneficial for their relatives regardless of sharing with the patient. The authors suggest that the weak point of the research was delivering a diary to the patient by relatives because the intensity of the intervention was not unified and could vary therefore the effect on patients could be non-optimal. Offering the diary to all patients regardless of their level of distress could also dilute the results as same as overriding patient's needs. Higher posttraumatic stress symptom scores of relatives in the control group can be also affected by the fact that there were more young people and females than in the intervention group because younger age and female gender are considered risk factors for the development of PTSD [11]. Another smaller RCT (n=35) comparing psychological education, ICU diaries and psychological education alone showed no benefit of ICU diaries. Authors suggested that it could be affected by lower access to psychological follow-up reported by ICU survivors included in the trial, family and staff member inconsistency in completing a diary. In our opinion difference between the number of males-24 and females-11 and quite low mean age (42) can also influence results similar way as in the previously analyzed article [12]. In Canadian single-center RCT patients were randomized to usual care, ICU diary, psychoeducation, or both ICU diary and psychoeducation. Patients who received a diary had significantly lower median Hospital Anxiety and Depression Scale anxiety. As the authors stated this was a pilot Canadian RCT to examine the feasibility of ICU diaries so patients, families, and staff were engaged and supportive of ICU diaries. The significant reduction in depression and anxiety symptoms at 3 months post ICU discharge in those who received the diary (with or without psychoeducation) is compelling and warrants further investigation

of these two interventions in a larger trial [13]. The biggest reviewed multi-center RCT took place in French ICUs from 2015 to 2017. There were 355 patients in the intervention group and 354 in the control group. This trial did not show a significant difference in the percentage of patients who reported significant PTSD symptoms at 3 months among both groups. These findings do not support the use of ICU diaries for preventing PTSD symptoms. Recruitment of patients from a set of ICUs, and studying the content of the diaries which showed a high rate of participation in all cent were strengths of this trial. On the other hand, the method of delivering the diaries to the patients, the absence of a sufficiently detailed narrative of ICU-stay in some patients and the fact we cannot generalize the results to other countries are the limitations of this trial [14].

Virtual reality

ICU-specific virtual reality is an innovative, feasible and acceptable intervention. Although it did not improve psychological outcomes or quality of life after critical illness, patients in the intervention group were generally more satisfied and relaxed after their stay in ICU. ICU-VR improved patients' perceived quality of, satisfaction with, and rating of ICU aftercare among COVID-19 ICU survivors. It seems important because low satisfaction negatively impacts psychological sequelae after critical care [15]. In another trial participants watched a graphical landscape, consisting of a mountain cabin near a lake at sunrise, followed by a relaxing moment in the clouds. It was accompanied by nature sounds. Results are consistent with findings from the previously mentioned trial [16].

Drugs and other substances

Dutch Dexamethasone for Cardiac Surgery Trial examined the influence of dexamethasone on PTSD symptoms. This trial was concerned with only one dose of dexamethasone intraoperatively during cardiac surgery but a longitudinal follow-up of 18 months showed no significant difference between intervention and control group [17]. In survivors of sepsis, treatment with intravenous vitamin C, thiamine, and hydrocortisone did not improve or had even worse cognitive, psychological, and functional impairments compared with placebo control. Treatment with vitamin C, thiamine, and hydrocortisone was associated with an increased chance of PTSD. There was no evidence of a treatment effect on depression [18]. The effect of supplemental enteral fish oil on psychological impairments in critically ill, multi-trauma patients were examined in another RCT. None of the tests evaluating anxiety, depression, or PTSD at 6 months were different between the study group and the control

group. There is a need to point out that in this study a large number of participants were lost for follow-up. What is more, it is unknown if patients who were tested received PTSD psychological therapy during the 6 months follow-up [19]. These results are consistent with findings from the 2015 RCT and in opposition to the theory that promoting neurogenesis by ω -3 supplementation early in the post-trauma period might ease the clearance of fearful memories and minimize PTSD symptoms [20].

Other prevention methods and interventions

Another RCT explored the effects of coping skills training program (CST) compared with an education program for critical illness survivors and their family members. CST contained six weekly telephone sessions with clinical psychologist and access to educational website. Education program was used as a comparator because funding agency, patients, and their family members stated that being randomized to not get any attention is unacceptable. Education program contained informational videos and access to educational website. Two calls were made with participants to answer their questions and review materials. Psychological distress symptoms measured with the hospital anxiety and depression scale (HADS) were not significantly different among the control and intervention group in both patients and their family members. What is interesting, CST was more beneficial for patients with high base-line distress levels 6 months after ICU stay and the education program was connected with greater improvement among patients ventilated longer than 7 days, but this phenomenon needs further investigation [21]. Pilot RCT was made to compare a self-directed mobile app-based mindfulness program; a therapist-led telephone-based mindfulness program; or a web-based critical illness education program. Despite the need for a larger trial, it seems that a mobile app-based program has feasibility, acceptability, usability, and impact on psychological distress and physical symptom comparable to a therapist-led telephone-based mindfulness program [22]. Another exploration of the feasibility of mobile-app-based coping skills training for adult intensive care patients showed promising effects compared to usual care but a larger trial is still needed to warrant the efficacy of this approach [23]. UK POPPI Trial evaluated the effects of nurse-led psychological intervention on symptoms of PTSD among 1458 enrolled ICU patients. The design of the trial was complex and contained a 3-days psychological training session and online course for nurses on how to implement psychological intervention in their practice. The focus of the 3-day training was to learn and practice the skills required to deliver the stress support sessions with patients whereas the 30-minute online course was designed to create a calm, less stressful environment by reducing

stressors and using good communication with patients. The main objectives of the stress support sessions were to develop a trusting relationship with patients, so patients can discuss concerns that they might feel embarrassed or worried about communicating, and to reduce emotional distress. This intervention did not significantly reduce patient-reported PTSD symptom severity at 6 months [24,25]. Another RCT from Oslo also examined the effect of nurse-led intervention on PTSD symptoms in patients screened positively by PTSS-10-I-B (n=224). The 3 consultations in the intervention group were based on a semi-structured guide with elements from trauma-related cognitive behavioral therapy combined with a narrative method and Antonovsky salutogenic theory. Patients were encouraged to make a narrative history of their ICU stay including delusions and traumatic experiences and to process traumatic memories. Unfortunately, this intervention did not reduce PTS symptoms nor increase any sense of coherence components within the first year compared with standard care [26]. The usage of 30-minute audio-visual stimulation was tested in Chinese RCT. The trial showed that patients' and their families' mental condition improved after implementing sensory stimulation. Researchers used family recordings with basic information about the ICU environment, communicating with patients with simple words and at a slow pace, playing radio programs, hand-held clocks and calendars, family photographs, books and magazines when patients in the control group received usual care. The intervention group showed lower PTSD, depression and delusional memory scores [27]. Training of patients and their primary care physicians was tested in German RCT and results showed that in the opposite to the intervention group, the control group made a significant increase of PTSD symptoms according to the Posttraumatic Symptom Scale in long-term follow-up but there was no difference in mental health-related quality of life. The intervention included case management focusing on proactive symptom monitoring by the patient, support for the primary care physicians provided by clinicians, and training for both patients and their primary care physicians in evidence-based post-sepsis care provided by ICU-experienced staff [28]. The transition from ICU to the general ward can be potentially stressful for patients. Written information booklets, combined with verbal information to empower patients in this process provided by ICU nurses decrease anxiety and depression in critically ill survivors but long-term results are unknown and should be assessed [29]. Another study showed that depression and anxiety connected with hospitals can be reduced with multimedia nurse-led education in the short-term but details of this intervention are unclear [30].

Discussion

High mortality, previous morbidity, cognitive impairments and limited competence to give legal consent make ICU patients a specific group of trial participants [31,32]. Mentioned authors had to face multiple problems when designing trials and analysis because when an ICU survivor declines to take part in a follow-up session with a researcher it could be a symptom of avoidance of people and places connected with trauma which is an important part of PTSD. This is why it is difficult to plan and conduct reliable trials and analyses on patients with PTSD.

The use of screening tools can give other results from a complete psychological assessment by a psychologist. Designing one universal screening scale with acceptable detectability of PTSD may unify conduct trials and has a positive impact on receiving reliable analysis results.

It seems that sedation strategy alone has a small or no impact on the occurrence of mental disorders in ICU survivors. Researches show that we should use ketamine with caution but we need more data to determine why the use of ketamine increases the short-term chance of PTSD.

The specificity of diary intervention makes it more common to blur boundaries between intervention and control groups. The unequal investment of ICU staff and family members in writing ICU diaries seems to play a role. In our opinion, the economic status of the trial country and the availability of an appropriate number of ICU staff might make a difference in the acceptance level and time investment of ICU workers in diary creation. ICU diaries are cheap and generally well-accepted interventions, which may help ICU survivors as well as their families in dealing with mental impairments after critical illness. Another advantage of ICU diaries is humanizing the sterile and for the general population unintelligible environment. We need further investigation to determine the practical usefulness of ICU diaries in individual countries. The spectrum of psychological interventions, multi-disciplinary post-ICU follow-up teams, and educational activities are still in an early stage. Although mobile apps-based psychoeducational programs show any superiority over therapist-led programs, we think that this type of apps will get more popular due to lack of psychological specialists in hospital departments in some countries. Future well-designed studies are needed to better understand mechanisms and potential interventions to improve mental impairments in post-intensive care syndrome.

Conclusions

Nowadays the efficiency of any specific method of prevention of mental impairments in ICU patients is not clearly proven by research. Nevertheless, there were conducted many trials which marked out new methods. To point out the recommended method with the most efficiency there is a need for further research.

After Conclusions

Recent discoveries in preventing mental impairments and ICU staff interventions in post-intensive care syndrome.

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Author Contributions

Conceptualization, P.Z., W.W.; methodology, P.Z.; investigation, P.Z., W.W., D.G., M.W., A.R.; resources, P.Z., W.W., D.G., M.W., A.R.; writing - rough preparation, P.Z., M.W., A.R., D.G., W.W.; writing - review and editing, W.W., D.G.; supervision, P.Z.; project administration, W.W., D.G.

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The data presented in this study are available on request from the corresponding author.

Conflicts of Interest

The authors declare no conflict of interest.

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