

C A S E R E P O R T

Psychiatric and physical rehabilitation intensive approach for suicide attempters by jumping from heights.

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Abstract. Suicide is an important public health problem and one of the leading causes of death worldwide. Suicide behavior is influenced by interacting biological, psychological, environmental and current situational factors. One of the most important components modulating the risk of suicide as well his prevention is mental health: it is estimated that up to 90% of individuals who attempt suicide meets the criteria for a psychiatric disorder. Multiple other factors, such as physical illness, can be related to suicidal behaviors. Medical disorders may themselves be associated with an increased risk of suicide or be consequence of violent suicide attempts such as jumping from height. Providing optimal treatment for patients with suicidal behaviors, especially if violent, involves multiple treatments that may include psychiatric, psychological and physical therapies. Using a case series approach, we describe an acute psychiatric treatment program combined with intensive rehabilitation therapy in patients hospitalized for violent suicide attempts caused by jumping from height. The patients were treated through a multidisciplinary, simultaneous and integrated care program made up of a team of psychiatrists and physiatrists who work dynamically together with a flexible approach based on the specific clinical characteristics of each patient. (www.actabiomedica.it)

Keywords: Suicide attempts, Violent suicide, Suicide by jumping, Psychiatric treatment, Physical rehabilitation.

Introduction

Suicide is a complex public health problem of global importance. According to the World Health Organization (WHO), approximately 1 million people die by suicide in the world each year (1). Precise estimates of suicide rate are difficult to obtain. It is estimated that 11.4 suicides per 100000 people occur per year: 15 suicides per 100000 for males and 8 suicides per 100000 for females (1). As a matter of fact, suicidal behavior differs between sexes, with higher rates of ideation and suicide attempts among women and suicide deaths among men. In high-income countries,

suicide behaviors are more common among middle-ages and elderly people (1). However, rates of suicide in young people are increasing and suicide is the second leading cause of death in individuals aged 15-29 years (2). Non-fatal suicidal behaviors are more common than suicides. It is estimated that there are 10-40 attempted suicides for each completed suicide (3). This ratio is higher among adolescents and decreases with age. Attempted suicide is the most important predictor of a completed suicide (4). Prevention of attempted suicide through adequate diagnostic procedures and treatment is an essential priority in the psychiatric praxis. Suicide behavior usually has no single cause and

is influenced by interacting biological, psychological, environmental and current situational factors. One of the most important components modulating the risk of suicidal behaviors as well their prevention is mental health (3). About that, it is estimated that up to 90% of individuals who attempt suicide meets the criteria for a psychiatric disorder and some psychiatric illnesses are more strongly linked to suicidal behaviors (5-6). Major depressive episodes, associated with either major depressive disorder or bipolar disorder, account for at least half of suicide deaths (7). Among bipolar disorder, affective episodes with mix features are more strongly associated with suicide behaviors (8). Adults with schizophrenia and other psychotic disorders are also at heightened risk (9) and the main predictors of suicide for these patients include male sex, young age, depressive symptoms, positive symptoms and low illness insight (10). Multiple other factors, such as personality disorder and alcohol and drug-related disorders, are common on people who attempt suicide and might exacerbate underlying risk of engaging in suicidal behaviors (11). Also, physical illness can be related to suicide behavior in several ways. First, specific medical disorders may themselves be associated with an increased risk for suicide or its treatment may lead to the development of psychiatric symptoms (3). In a recent study of our research group, the 30.6% of a large sample of BD patients attempted violent suicide and the use of violent suicide methods was correlated with higher body weight and body mass index (BMI) (12). Alternatively, physical illness may be a consequence of violent suicide attempts as jumping from heights (13). Jumping from height accounts for 19.2% of 3935 suicide death in Italy each year and similar incidence are found in the rest of Europe (14-15). Jumping requires no equipment and is easily carried out with little planning and is likely to be fatal in high percentage of cases. As emerges from a recent study of our research team, patients who attempt suicide by falling from height show multiple and severe injuries and need longer intensive care compared to patients with accidental fall (16). It follows that patient who attempt suicide by jumping from height need to have a careful diagnostic examination in order to deliver organized and timely care. Providing optimal treatment for patients with suicidal behaviors frequently

involves a multiple treatment that includes psychiatric, psychological and physical therapies. Usually, the management of these patients requires a multidisciplinary approach with the collaboration of psychiatrists, orthopedists, physiatrists and other health specialists.

Using a case series approach, we describe an acute psychiatric treatment program combined with intensive rehabilitation therapy in patients hospitalized for violent suicide attempts caused by jumping from height.

Material and methods

Patients

Subjects comprised of consecutive patients referred to San Luigi Gonzaga University Hospital of Orbassano (Turin, Italy) from January 2014 to December 2020. We included patients who attempted suicide by jumping from height that require extensive and multidisciplinary treatment. For the purpose of the present study, only patients with a main diagnosis of a psychiatric disorder according to the criteria of Diagnostic and Statistical Manual of Mental Disorders–Fifth Edition (DSM-5) (17) were considered. Exclusion criteria included age <18, death prior to admission and lack of data.

Assessments and procedures

Psychiatric diagnoses were assessed using Mini International Neuropsychiatric Interview (MINI) (18). During hospitalization, all patients were treated through a multidisciplinary, simultaneous and integrated care program consisting of acute psychiatric treatments and intensive rehabilitation therapies. The psychiatric treatment consisted of pharmacotherapy combined with psychosocial interventions such as psychological support, psychoeducation, cognitive remediation and behavior therapy. The type of pharmacotherapy and psychosocial intervention was related to evaluation of each specific case. Certified psychiatrists, residents in psychiatry supervised by senior psychiatrists and psychologists trained in specific techniques of psychotherapy performed the acute psychiatric

treatment. Depending on each case, specific rating scales such as Hamilton Depression Rating Scale (HDRS) (19) and Positive and Negative Symptoms Scale (PANSS) (20) were administered to the patients at the beginning and at the end of treatment program in order to assess clinical response and remission. Intensive rehabilitation therapy, as defined by Centers for Medicare & Medicaid Services (CMS), consisted of a comprehensive and tightly coordinated rehabilitative treatment provided by a multidisciplinary team of rehabilitation specialists (21). These teams included rehabilitation physicians, nurses, case managers, social workers and licensed or certified therapist from every discipline involved in the treatment of each patient, which may include physical therapy, occupational therapy, speech-language pathology and/or prosthetics/orthotics, among others. Depending on person's mental and physical health, treatment and care were provided in psychiatric ward or in rehabilitation service within the same hospital with flexible approach. Socio-demographic and clinical characteristics were

collected for each subject from a review of individual patients' medical records.

Results

The case series represents nine subjects: among them seven (77.78%) were male and two (22.22%) were female. The average age was 33.88 years (standard deviation [SD] 8,10). All subjects met lifetime DSM-5 criteria for mental disorder. Specifically, one patient (11.11%) met DSM-5 criteria for Major Depressive Disorder and Borderline Personality Disorder, one patient (11.11%) for Bipolar Disorder type II, three patients (33.33%) for Schizoaffective Disorder and four patients (44.45%) for Schizophrenia. All patients present multiple and severe injuries associated with their violent suicide attempts that require extensive treatment.

Demographic data, clinical characteristics and multidisciplinary treatment program of the patients are given in Table 1.

Table 1. Demographic data, clinical characteristics and multidisciplinary treatment program of the sample (n=9).

Case	Sex	Age	Psychiatric diagnosis	HDRS		Treatment program
				Baseline Discharge % score reduction	PANSS Baseline Discharge % score reduction	
1	M	29	Schizophrenia	- - -	150 70 53.3%	Psychiatry Unit ↓ Rehabilitation Unit
2	M	28	BD type II	22 9 59.0%	- - -	Rehabilitation Unit with psychiatric advice
3	F	22	MDD + Borderline Personality Disorder	27 15 44.4%	110 65 40.9%	Rehabilitation Unit ↓ Psychiatry Unit
4	F	24	Schizophrenia + Intellectual Disability	- - .	122 57 53.2%	Psychiatry Unit ↓ Rehabilitation Unit ↓ Psychiatry Unit
5	M	40	Schizophrenia	- - -	90 48 46.6%	Psychiatry Unit with rehabilitation advice
6	M	46	Schizophrenia	- - -	100 65 35.0%	Psychiatry Unit with rehabilitation advice

Table 1 (Continued)

Case	Sex	Age	Psychiatric diagnosis	HDRS	PANSS	Treatment program
				Baseline Discharge % score reduction	Baseline Discharge % score reduction	
7	M	38	Schizoaffective disorder	17 10 41.1%	163 86 47.2%	Psychiatry Unit with rehabilitation advice
8	M	43	Schizoaffective disorder	28 11 60.7%	103 56 45.6%	Physiatry Unit with psychiatric advice
9	M	32	Schizoaffective disorder	25 12 52.0%	135 86 36.2%	Psychiatry Unit ↓ Rehabilitation Unit

HDRS = Hamilton Depression Rating Scale, PANSS = Positive and Negative Symptoms Scale
BD = Bipolar Disorder, MDD = Major Depressive Disorder

Case reports

Case 1: Mr. A.

The first patient was a male of 29 years that attempted suicide by self-defenestration from his home. He had a previous history of psychiatric disorder: specifically, he was affected by Schizophrenia and had been under treatment for a few months with poor adherence. Multiple injuries were reported following the suicide attempt: spinal injury, pelvic fractures and lower limb fractures. Mr. A. has been treated with multidisciplinary program organized in two steps. First of all, after orthopedic surgery, Mr. A. was admitted to psychiatric ward. Psychopharmacological treatment (specifically, clozapine, lithium sulfate and valproic acid) had a significant role in reducing acute psychiatric symptoms such as psychotic symptoms, depression, anxiety and insomnia. Specifically, the percentage reduction with respect to baseline after the combined psychiatric treatments was 53.3% of the PANSS scores. In addition to pharmacotherapies, psychotherapies played a central role in the management of suicidal behavior. Specifically, cognitive behavior therapy and psychoeducation therapy with the support of the family was applied. Also crucial during the hospitalization in the psychiatric ward, was the simultaneous collaboration with physiatrist clinicians who followed-up the multiple injuries and started the physical rehabilitation. Subsequently, after the hospitalization in the psychiatric unit lasting about three

months, the second phase of the integrated and multi-disciplinary treatment program was the hospitalization in physical medicine and rehabilitation ward, lasting about two months. Mr. A. completed physical rehabilitation with daily monitoring of psychiatric status and response to treatment by psychiatric team. The patient after hospital discharge was sent to outpatient psychiatric care with clinical monitoring, involvement of family members and frequent telephone contacts.

Case 2: Mr. B.

The second patient was a male of 28 years that attempted suicide by jumping from the rooftop of a residential building. He had no previous history of psychiatric illness. Mr. B. reported multiple injuries: brain injuries with craniofacial fractures, pelvic fractures, lower limb fractures and abdominal injuries treated with neurosurgical and orthopedic surgery. Afterwards, Mr. B. was hospitalized in physical medicine and rehabilitation ward. During the hospitalization, lasting about ten months, the patient was seen often by psychiatric team. The identification of specific psychiatric signs and symptoms (such as impulsiveness, agitation, anxiety, depression, etc.), the assessment of past suicidal behavior, the review of family history and psychosocial situation were crucial elements of the psychiatric evaluation. With clinical diagnostic interview and the involvements of the family, the psychiatric team diagnosed a major depressive episode associated with Bipolar Disorder type II. Consequently, physical

rehabilitation was accompanied by psychopharmacological and psychological treatments (specifically, quetiapine, valproic acid and psychoeducation therapy) with daily monitoring of psychiatric status and response to treatment by psychiatric team. The combination of psychopharmacological and psychological treatments significantly improved depressive symptoms and at the end of the hospitalization there was full remission of depression (HDRS<10). After hospital discharge, the patient continued the psychopharmacological treatment in outpatient psychiatric service with follow-up aimed at monitoring clinical progress and possible side effects.

Case 3: Ms. C.

The third patient was a woman of 22 years who attempted suicide by self-defenestration from her therapeutic community. She had long been treated for Major Depressive Disorder and Borderline Personality Disorder and she had a previous history of suicidal attempt. Ms. C. suffered injuries to more than one body region: upper and lower limbs fractures, pelvic fractures and rib fractures. Following orthopedic surgery, Ms. C. was transferred to physical medicine and rehabilitation ward. The hospitalization lasted only eight days as the psychopathological state of the patient went into a rapid exacerbation of the symptoms. Specifically, the patient showed psychomotor agitation crisis with psychotic symptoms and therefore a transfer to the psychiatric ward was decided. In early stage of hospitalization in psychiatry unit, the treatment plan was implemented to quickly address the psychotic and agitation symptoms. The early use of intensive psychopharmacological treatment (specifically lithium carbonate, quetiapine and risperidone) allowed significant changes of patient's psychiatric status with a greater diminution of suicidal thoughts, psychotic and depressive symptoms (44.4% HDRS and 40.9 PANSS scores reduction with respect to the baseline). In addition to pharmacotherapies, psychotherapeutic approach (cognitive behavior therapy), psychosocial interventions and involvement of family were effective in specific skills, such as impulse control, insight of mental disorder and adherence to treatment plan. During the hospitalization in psychiatry ward,

Ms. C. continued physical rehabilitation program with the collaboration of psychiatrists and after about one month was transferred to physical medicine and rehabilitation ward. For about five months the patient underwent an intensive physical rehabilitation program with daily monitoring of psychiatric disorders and possible side effects of medication by psychiatric team. Every effort to assure that the patient continues the psychopharmacological treatments and the clinical follow up in psychiatric outpatients' departments was given before the discharge.

Case 4: Ms. D.

The fourth patient was a woman of 24 years who attempted suicide by jumping from the balcony of her group home. She had a previous history of psychiatric disorder: specifically, she was affected by Schizophrenia and Intellectual Disability. Ms. D. reported bilateral calcaneus fracture as the result of the suicide attempt and was hospitalized immediately. After an initial assessment in emergency department, the patient was admitted to psychiatric unit. The PANSS baseline score was 122. The acute psychiatric hospitalization was necessary to restart antipsychotic medication previously stopped by the patient. Psychopharmacological treatment (specifically, chlorpromazine and delorazepam) had a significant role in reducing psychotic symptoms and anxiety as well as in improving awareness of illness. Subsequently, Ms. D. was transferred to physical medicine and rehabilitation ward. Patient was rehabilitated through passive mobilization and active assisted exercise. Physical rehabilitation was accompanied by daily monitoring of psychiatric status and response to treatment by psychiatric team. After two months of physical rehabilitation, Ms. D. was transferred back to the psychiatry ward in order to plan long-term psychiatric care. At the end of hospitalization, the patient had a significant clinical improvement (PANSS score: 57) and was transferred to a therapeutic community.

Case 5: Mr. E.

The fifth patient was a male of 40 years affected by Schizophrenia who attempted suicide by self-defenestration through a first-floor window of his

home. Mr. E. suffered injuries to more than one body region: right lateral tibial plateau fracture and rib fractures. After orthopedic surgery, Mr. E. was admitted to psychiatric ward. Psychiatric treatment plan was implemented to quickly address the psychotic and depressive symptoms. Specifically, pharmacotherapy (aripiprazole and lorazepam) and psychotherapeutic approach (cognitive behavior therapy and psychoeducation) have been effective in relieving psychotic symptoms and in improving adherence to treatment plan. The percentage reduction in score with respect to baseline after 6 weeks of treatment was 46.6% of the PANSS. During hospitalization in psychiatric unit, psychiatrist clinicians followed-up the patient for daily physical rehabilitation. At the end of treatment program, Mr. E. was able to walk with mild motor dysfunction and was discharged to a neuropsychiatric rehabilitation center.

Case 6: Mr. F.

The sixth patient was a male of 46 years that attempted suicide by self-defenestration from his therapeutic community. He was affected by Schizophrenia. Mr. F. was found to have multiple fractures of ribs, left elbow and scapular fracture. Following emergency treatments and orthopedic surgery, the patient was admitted to psychiatric unit. During the first three weeks of hospitalization, the treatment plan was implemented to quickly address psychotic and agitation symptoms. Psychopharmacological treatment (specifically clozapine and aripiprazole) and cognitive behavior psychotherapy allowed significant changes of patient's psychiatric status (PANSS scores reduction with respect to the baseline: 35.0%). Subsequently the acute stabilization of the mental illness, Mr. F. started physical rehabilitation program with a progressive and significant improvement of physical and medical condition. After two months of hospitalization, the patient continued the care program in outpatient psychiatric care with clinical monitoring and psychosocial rehabilitation.

Case 7: Mr. G.

The seventh patient was 38-year-old man affected by Schizoaffective disorder with a previous history of

suicidal attempt. Mr. G. attempted suicide by falling down stairs in his home and reported right femoral neck fracture and multiple fractures of ribs. Following emergency and surgical treatments, the patient was admitted to psychiatric unit. Cognitive behavior therapy was effective in reducing deficits in emotional regulation, impulse control and anger management. In addition to psychotherapeutic approach, psychopharmacological treatment (specifically sodium valproate, haloperidol and paliperidone) had a significant role in reducing psychotic symptoms and psychomotor agitation. The percentage reduction in score with respect to baseline after three weeks of combined psychiatric treatments was 41.1% for the HDRS and 47.2% for the PANSS. Moreover, during the hospitalization period, crucial was the simultaneous collaboration with psychiatrist team that promptly started a motor and functional rehabilitation. After hospital discharge, Mr. G. received outpatient care at psychiatric departments with follow-up aimed at maintaining therapeutic alliance, coordinating treatments and monitoring patient's clinical progress.

Case 8: Mr. H.

The eight patient was a male of 43 years who attempted suicide by an intentional fall from the 5th floor of a building. Mr. H. had long been treated for Schizoaffective disorder and had a previous history of suicidal attempt. On initial emergency assessment, he was found to have traumatic hemorrhagic shock and multiple injuries including hemopneumothorax, brain hemorrhage, unstable sacral fracture and left femoral neck fracture. Mr. H. was admitted immediately to intensive care unit. Hemodynamic stabilization was performed and subsequently was planned orthopedic surgery to obtain early stabilization of fractures. Following orthopedic surgery, Mr. H. was transferred to physical medicine and rehabilitation ward. Physical rehabilitation was accompanied by intensive psychiatric care. The baseline scores of HDRS and PANSS were 28 and 103 respectively. The psychiatric management included cognitive behavior therapy aimed at encouraging treatment adherence and coping strategies. Furthermore, the early use of psychopharmacological treatment (specifically lithium carbonate,

sodium valproate and olanzapine) was helpful to rapidly address agitation, psychotic symptoms and insomnia. For about six months the patient underwent the intensive physical rehabilitation program with daily monitoring of psychiatric status and possible side effects of medication by psychiatric team. At the end of hospitalization, the patient had a significant clinical improvement (HDRS and PANSS scores: 11 and 56, respectively) and satisfactory motor recovery. With the collaboration of family members, Mr. H. continued psychopharmacological and psychotherapeutic treatments in outpatient psychiatric service.

Case 9: Mr. I.

The ninth patient was a 32-year-old man affected by Schizoaffective disorder. Mr. I. attempted suicide by jumping from the 4th floor window of his home. The patient reported lung contusion, thoracolumbar burst fracture, bilateral calcaneus fractures and multiple fractures of limbs. Intensive treatment care and orthopedic surgery were immediately performed and subsequently the patient was admitted to psychiatry unit. Psychiatric care program included a short-term treatment with benzodiazepines (intravenous lorazepam) and a long-term maintenance treatment with lithium and risperidone. Psychopharmacological treatment had a significant role in reducing psychic anxiety, psychotic symptoms and depression as well as in improving awareness of illness (52.0% HDRS and 36.2% PANSS scores reduction with respect to the baseline). In addition, by targeting deficits in specific skills (emotional regulation and interpersonal assertiveness) cognitive behavior therapy was effective in reducing suicide risk. Subsequently, Mr. I. was transferred to physical medicine and rehabilitation ward. For about two months the patient underwent an intensive physical rehabilitation program and continued psychiatric treatments with daily collaboration of psychiatrist. At the end of hospitalization, the patient was discharged to a neuropsychiatric rehabilitation center.

Discussion

Suicidal behavior is one of the most serious psychiatric emergencies. Treatment of suicidal crisis is

complicated and requires a series of considerations. First of all, mental health professionals should carry out a careful diagnostic examination after a suicide attempt even when this evaluation occurs in emergency department or in other hospital wards. During the evaluation the psychiatrist obtain information about the patient's psychiatric and other medical history and current mental state. These information enables the psychiatrist to develop a differential psychiatric diagnosis and to determine, together with the others health professionals, the most appropriate therapy and setting for the treatment. It is established that patients who survive their violent suicide attempts, such as jumping from a height, usually have severe injuries to more than one body region that require multiple and extensive treatment. The high risk of fractures is caused not only by the height of the fall but also by the possible use of psychopharmacological therapies. Suicide by jumping, in general appear to be more often chosen by subject suffering from schizophrenia. Current use of antipsychotics and longer duration of these therapies may contribute to the risk of bone fracture as they may alter the metabolism of bone cells and cause a loss of bone mineral density via hyperprolactinemia (22). It follows that the suicidal treatment should always be comprehensive and include psychiatric, psychological and physical perspectives. Suicidal behaviors are heterogeneous, both in terms of presentation and physical effects, making it difficult to provide an all-encompassing treatment model. In consideration of the complexity of the phenomenon, we have presented an overview of the multidisciplinary formula which we developed at San Luigi Gonzaga University Hospital of Orbassano (Torino, Italy). Our treatment program was applied for the treatment of nine violent suicide attempts caused by jumping from height. What characterizes our treatment program is the multidisciplinary, simultaneous and integrated formula made up of a team of psychiatrists and physiatrists who work dynamically together. In order to deal with heterogeneity of suicidal behaviors, in terms of presentation and physical effects, the type of psychiatric and physical intervention was evaluated with flexible approach according to each specific case. In the suicidal crisis, all patients received a real support and their discomfort and suffering were recognized and treated. About that, all patients had a rapid diagnostic process

and, after a timely orthopedic surgery, had access to a psychiatric and physical management. Specifically, the psychiatric therapy was established by a combination of biological treatment, psychological and social interventions with an interactive process in which the psychiatrist works with the patients and their family to implement and modify treatments over time. In some cases, the patients received these treatments during their hospitalization in the psychiatry unit with a subsequent monitoring in the physical medicine and rehabilitation ward, in other cases, the patients received the psychiatric treatments directly in the physical medicine and rehabilitation ward. Moreover, for all patients, the rehabilitation and physical therapy, performed both in psychiatry and in physical medicine and rehabilitation ward, played a crucial role in performance enhancement and restoration of full neuromotor function. The multidisciplinary and integrated treatment program described showed a good clinical efficacy in acute phase with a significant reduction of acute psychological distress, psychiatric symptoms and neuromotor disability. It is well known that patients with attempted suicide, especially if they had physical reliquary, are at very high risk for repetition of suicidal behavior (3). Even if, during a suicide crisis, acute multidisciplinary treatment of the patient is the first priority, long-term treatment and follow-up strategies are to be started as soon as possible. Indeed, the team of psychiatrists and physiatrists, before the hospital discharge, did every effort to assure that the patients continue the psychopharmacological treatments with clinical follow up in psychiatric outpatients' departments and rehabilitation courses. The next goal of our research team is to evaluate the long-term effectiveness of our multidisciplinary treatment program in terms of clinical progress, possible repetition of suicidal behavior and physical recovery.

Our treatment model must be interpreted in light of several limitations of this paper: retrospective collection of the cases, small sample sizes, heterogeneity of recruited patients in terms of clinical characteristics (e.g.: psychiatric diagnosis, physical injuries, drug treatments) and flexible treatment program which does not make it an all-encompassing treatment formula.

In conclusion, the multidisciplinary treatment of suicidal crisis should be deepened. In particular further perspective and controlled studies on larger samples,

better if include long-term follow-up, are necessary to expand the available data regarding the therapeutic interventions. Moreover, greater sensitivity to suicidal behavior is needed in order to gradually and steadily improve suicide treatment and prevention strategies in psychiatric care.

Founding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interest: Gianluca Rosso is/has been a speaker and/or consultant from Angelini, Janssen, Lundbeck, and Otsuka. Giuseppe Maina is/has been a consultant and/or a speaker and/or has received research grants from Angelini, Boehringer Ingelheim, FB-Health, Janssen, Lundbeck, Otsuka and Innova Pharma. The remaining authors declare that she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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Received: 11 March 2021
Accepted: 15 July 2021
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