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Effectiveness of Telehealth Physical Therapy Compared to In-Person Physical Therapy On Pain And Disability In Patients With Non-Specific Chronic Low Back Pain: A Retrospective Case Series

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EFFECTIVENESS OF TELEHEALTH PHYSICAL THERAPY COMPARED TO IN-PERSON PHYSICAL THERAPY ON PAIN AND DISABILITY IN PATIENTS WITH NON-SPECIFIC CHRONIC LOW BACK PAIN: A RETROSPECTIVE CASE SERIES

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Abstract

Background: Physical therapy is a successful treatment option for non-specific chronic low back pain (NCLBP). Telehealth physical therapy (TPT) is a beneficial treatment option for various musculoskeletal conditions, but its effectiveness in treating NCLBP remains unclear. The purpose of this study was to assess the effectiveness of TPT compared to in-person physical therapy (IPT) on pain and disability in patients with NCLBP.

Methods: Data were extracted from electronic medical records of adults with NCLBP who received care between June 1, 2020 and September 30, 2021. Patients included males or females who were 18 years or older, had NCLBP, and received IPT or TPT. Pain and disability were assessed using the Numeric Pain Rating Scale (NPRS) and Modified Oswestry Disability Index (MODI), respectively. Statistical analysis of the data was performed to determine within and between group differences in pain and disability.

Results: There were no significant differences in pain or function between groups at discharge. Pain decreased significantly in both groups at discharge (TPT: -3.18; IPT: -2.75). Disability did not significantly change in either group, but there was a trend that disability at discharge lessened in the TPT group (p=0.53).

Conclusion: In patients with NCLBP, TPT and IPT resulted in similar reductions in pain and disability. Further research with larger sample sizes should investigate IPT and TPT in treating NCLBP to truly identify if there is one mode that is more effective.

Impact Statement: TPT is a viable alternative to IPT in patients with NCLBP resulting in similar reductions in pain and disability. However, variables unaccounted for in this

study such as, lack of homogeneity in our chronic LBP criteria and unstandardized physical therapy treatment, may limit the effectiveness of this form of care.

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Background

Chronic low back pain (CLBP) is a growing health problem worldwide.[1] CLBP is associated with increased age, with 19.6% of individuals between 20 and 59 years old and 25.4% of adults 60 and older experiencing this condition globally.[1,2] CLBP is also associated with increased healthcare costs due to physician visits, spinal injections, and surgery, among other treatments.[2,3] Stevans et al. indicated that 32% of individuals with acute low back pain will develop CLBP.[4]

CLBP is linked to lower socioeconomic status and the substantial costs associated with medical treatments may be a barrier to attaining optimal care.[2,3] Physical therapy (PT) may be a more affordable option for improving outcomes in patients with CLBP compared to non-PT treatment.[5–18] Evidence suggests that PT interventions including exercise therapy, manual therapy, motor control training, or trigger point dry needling can improve pain and disability in individuals with CLBP. [5–11] Pain neuroscience education or cognitive behavioral therapy combined with physical therapy have also demonstrated improvement in outcomes.[9,10,12-14] While in-person PT (IPT) is beneficial to improve function in patients with CLBP, some patients are unable to attend IPT due to a variety of barriers. Potential barriers may include: living in remote locations, travel time, assistance needed by some individuals to leave home, and associated costs such as time lost from work and childcare. These barriers negatively impact patients' ability to obtain IPT services.[19] Moreover, the COVID-19 pandemic-related safety protocols created an additional barrier to delivery of IPT.[20]

Over the last decade there has been increased utilization of telehealth, where health-related information and services are being delivered using secure electronic

communication, which may provide a more cost-effective and accessible option compared to traditional in-person health care services.[19,21–23] Importantly, in the year 2020 the COVID-19 pandemic resulted in an almost overnight stoppage of non-emergent medical care and a rapid increase in the use of telehealth to provide medical care.[20] Telehealth physical therapy (TPT) services were implemented to overcome barriers of delivering IPT services that were magnified during the COVID-19 pandemic. Benefits of TPT include expanded ability to connect with physical therapy providers regardless of distance and decreased time and costs associated with travel by reducing or eliminating the need to attend IPT visits.[19] Despite the benefits that TPT offers, barriers to this form of healthcare delivery include internet connectivity issues, user hesitancy, insurance funding, physical therapist training of virtual care delivery, and inability to provide PT interventions that can only be administered in person such as manual therapy.[19] Patient cognitive ability and difficulties seeing or hearing can create additional barriers to delivery of TPT services.[24]

Evidence suggests that TPT produces comparable outcomes to IPT services for a spectrum of musculoskeletal diagnoses and can result in better patient satisfaction, compliance, and adherence.[22,23,25,26] Additionally, TPT can be a valid and reliable means of assessing musculoskeletal disorders.[27] Research shows significant agreement between IPT and TPT assessment of CLBP through eliciting symptoms, sensitizing straight leg raise test, and specific lumbar movements to detect pain.[28] High intra-rater and inter-rater reliability in assessment of CLBP through lumbar spine mobility, lumbar motor control, function, disability, and pain questionnaires have also been demonstrated.[29] While IPT services can be effective in managing CLBP, TPT may

be more affordable and accessible for individuals with CLBP while providing comparable results.[6,30] Mbada et. al demonstrated that telehealth-based Mckenzie therapy produced similar outcomes to clinic-based Mckenzie therapy in pain reduction in adults with non-specific CLBP (NCLBP).[30] Other literature suggests that telehealth-based interventions alone are no more effective at managing non-specific LBP than minimal interventions, such as providing LBP information or non-health-related care.[31,32]

While some evidence suggests that TPT can be beneficial for a spectrum of musculoskeletal conditions, limited research is available for NCLBP. Therefore, the purpose of this case series was to assess the effectiveness of TPT compared to traditional IPT on pain and disability in patients with NCLBP.

Methods

A retrospective analysis was performed on patients who received PT either in-person or remotely via telehealth for NCLBP at outpatient clinics under Alliance Physical Therapy Partners (APTP) between June 1, 2020 and September 30, 2021. The World Health Organization officially declared COVID-19 a global pandemic on March 11, 2020.[33] Therefore, authors selected a start date of June 1, 2020, a date approximately 3 months after the start of the COVID-19 pandemic, to reduce extraneous variables accompanying the learning curve of transitioning to TPT. This case series research was approved by the institutional review board at The University of Texas at El Paso.

Patients

Male and female patients 18 years and older with NCLBP were included in this case series. This age group was selected as NCLBP is primarily associated with adult

age groups.[2] NCLBP is defined as low back pain lasting more than three months (12 weeks) and not attributable to a recognizable, known specific pathology such as infection, tumor, osteoporosis, lumbar spine fracture, structural deformity, inflammatory disorder, radicular syndrome, or cauda equina syndrome.[34] Two groups, IPT and TPT, were researched. IPT is operationally defined as patients that exclusively received PT treatment in-person. TPT is operationally defined as patients who received all treatment sessions through health services delivered remotely via electronic communication - including but not limited to: websites, telephone, and video conferencing systems.[31] The evaluation and discharge within the TPT group could have been executed in either fashion (telehealth or in-person). Patients must have attended a minimum of five total physical therapy visits including evaluation and discharge.

Because the purpose of this case series was to compare the effectiveness of IPT and TPT, patients who received TPT and completed any treatment session aside from his or her evaluation and discharge via IPT were excluded from this study. Individuals with spinal pathologies such as cancer, fracture, systemic diseases, and congenital deformities or who have undergone spinal surgery were excluded because these conditions contradict the operational definition of NCLBP and may have skewed outcomes being assessed. Pregnant women were also excluded from this study. Lastly, individuals undergoing hormone therapy and/or gender transition were excluded due to limited research on how these procedures and treatments affect the body.

Outcome Measures

The primary outcome measures of this case series were disability and pain which were measured using the Modified Oswestry Disability Index (MODI) and Numeric Pain

Rating Scale (NPRS), respectively. The MODI and NPRS were measured at initial evaluation and discharge.

The MODI is a valid and reliable measure of disability deriving from low back pain that consists of 10 items that address patient function.[35] Each item is scored from a 0 to 5, with higher numbers indicating a greater level of disability. The minimal clinically important difference (MCID) of the MODI for patients with CLBP is 6 points.[35]

The NPRS is a valid and reliable outcome measure to assess pain level.[36] Patients use a 0-10 scale to indicate their pain level with 10 representing the most pain. Two values for pain were collected for each participant; one at rest and one during activity. The researchers took the higher of the two and omitted the lower score to maintain consistency during statistical analysis. Patients required a minimum initial score of 2 on the NPRS since the MCID for patients with NCLBP is 2.[36] Therefore, setting the inclusion criteria threshold to 2 allows the researchers to draw conclusions on meaningful changes in pain.

Interventions

Patients included in the study were categorized into either an IPT group or a TPT group dependent on the mode of treatment received during their episode of care. The IPT group received all treatment sessions in-person and the TPT group received telehealth-based treatment. The TPT groups initial and discharge evaluations may have been provided in person. Interventions between the two groups were compared to assess similarities. Patients in the TPT group primarily received supervised therapeutic exercise and therapeutic activity whereas the IPT group additionally received manual therapy techniques and modalities.

Procedure

Patient information including sex, age, duration of symptoms, initial and discharge MODI and NPRS values, number of visits, the mode in which each treatment visit was provided (in-person or telehealth), patient attendance, CPT-4 intervention codes, pregnancy status, and utilization of hormone therapy were extracted from patient electronic medical records by staff from APTP. The ICD-10 code used to identify non-specific low back pain at initial evaluation was M.54.5. The patient data files were de-identified and replaced with identification numbers by APTP, which were then made available to the first four authors of the study.

Statistical Analysis

A power analysis, with power set at 80%, revealed each group required 17 subjects in order to meet power. Descriptive statistics using means and standard deviations were used to describe characteristics between the groups at baseline. A test of normality was used to determine if baseline data between the two groups was normally distributed. A two-way repeated measures analysis of variance (ANOVA) was used for pain and disability to determine between-group and within-group differences. A least significant difference test was used for post-hoc pairwise comparisons. This was done to obtain higher statistical power during data analysis given the limited number of patients completing both outcome measures at discharge. The alpha level was set at 0.05 to indicate statistical significance in all statistical analyses.

There was no need for external funding to perform this study.

Results

Sample Characteristics

While 17 patients per group were required to attain 80% power, only 27 patients met all inclusion/exclusion criteria (13 in the IPT group; 14 in the TPT group). Moreover, only 11 patients in each group completed MODI at baseline and discharge while 8 patients in each group completed baseline and discharge NPRS scores. Therefore, data analysis on MODI and NPRS included 22 patients and 16 patients, respectively.

TABLE 1. Group Descriptive Statistics

	TPT Group	**IPT Group**	***p***
n	14	13	-
Male	7	7	-
Female	7	6	-
Mean Age in years (*SD*)	46.7 (*12.7*)	47.5 (*12.2*)	0.878
Mean visits per person (*SD*)	11.8 (8.6)	13.7 (7.9)	0.554
Total Visits	165	178	-

Table 1 shows the characteristics of both groups. The mean age of participants was 46.7 ± 12.7 in the TPT group and 47.5 ± 12.2 in the IPT group. Total visits were 165 and 178 in the TPT and IPT groups, respectively. Mean visits per person were 11.8 ± 8.6 in the TPT group and 13.7 ± 7.9 in the IPT group. There were no significant differences in mean age or mean visits per person between groups. (p=0.878, and p=0.554, respectively).

TABLE 2. Between-Group Comparisons in MODI and NPRS

MODI Outcome Measure					
Time	**Group**	**Mean (SD)**	**Mean Diff.**	***p***	**95% CI**
Initial	TPT	19.4 (11.8)	0.36	0.941	-9.78 to 10.51
	IPT	19.0 (11.0)			
Discharge	TPT	12.8 (12.6)	5.97	0.597	-14.66 to 8.66
	IPT	15.8 (13.6)			
NPRS Outcome Measure					
Initial	TPT	6.4 (2.8)	0.250	0.850	-2.54 to 3.04
	IPT	6.1 (2.4)			
Discharge	TPT	2.6 (2.5)	-0.750	0.625	-3.96 to 2.46
	IPT	3.4 (3.4)			

* = statistical signficance; TPT = Telehealth Physical Therapy; IPT = In-person Physical Therapy; n = number of patients; SD = standard deviation; MODI = Modified Oswestry Disability Index (numerical value on 50-point scale); NPRS = Numeric Pain Rating Scale (numerical value on 10-point scale)

Table 2 displays between-group differences in MODI and NPRS scores. Prior to treatment, patients in the TPT group reported an average score of 19.4 ± 11.8 on the MODI while the IPT group reported 19.0 ± 11.0 demonstrating no significant differences between these 2 groups at initial encounter on this outcome measure (p=0.941). After treatment, disability scores for the TPT and IPT groups improved to 12.8 ± 12.6 and 15.8 ± 13.6, respectively, resulting in no significant difference at discharge between the two groups (p=0.597).

With respect to NPRS scores, the TPT group reported a mean of 6.4 ± 2.8 while the IPT group reported a mean of 6.1 ± 2.4 before treatment. These scores resulted in

no significant difference between the 2 groups (p=0.850). After treatment, mean pain improved to 2.6 ± 2.5 and 3.4 ± 3.4 in the TPT and IPT groups, respectively. There was no significant difference between the two groups at discharge for pain (p=0.625).

TABLE 3. Within-Group Comparisons of MODI and NPRS

TPT GROUP						
Outcome Measure (n)	**Initial Mean (SD)**	**Discharge Mean (SD)**	**Mean Diff.**	**Std. Error**	***p***	**95% CI**
MODI (11)	19.4 (11.8)	12.8 (12.6)	-6.55	3.18	0.053	-13.17 to 0.08
NPRS (8)	6.4 (2.8)	2.6 (2.5)	-3.75	1.00	0.002*	-5.90 to -1.59
IPT Group						
MODI (11)	19.0 (11.0)	15.8 (13.6)	-3.18	3.18	0.328	-9.80 to 3.44
NPRS (8)	6.1 (2.4)	3.4 (3.4)	-2.75	1.00	0.016*	-4.90 to -0.59

* = statistical significance; TPT = Telehealth Physical Therapy; IPT = In-person Physical Therapy; n = number of patients; SD = standard deviation; MODI = Modified Oswestry Disability Index (numerical value on 50-point scale); NPRS = Numeric Pain Rating Scale (numerical value on 10-point scale

Table 3 demonstrates within group differences of MODI and NPRS. Patients in the TPT group reported mean initial MODI scores of 19.4 ± 11.8 compared to their discharge scores of 12.8 ± 12.6. No significant difference was found between initial and discharge MODI scores (p=0.053). Furthermore, the TPT group reported mean initial NPRS scores of 6.4 ± 2.8 compared to discharge scores of 2.6 ± 2.5. Significance was found between initial and discharge scores (p=0.002).

Similar to the TPT group, the IPT did not experience a significant decrease in MODI scores from initial evaluation to discharge (p=0.328). Mean NPRS scores at

baseline for the IPT group were 6.1 ± 2.4. These decreased to 3.4 ± 3.4 at discharge which reached significance (*p*=0.016).

Both MODI and NPRS demonstrated a time effect without interaction. Both groups demonstrated a small effect size and power in function (0.19 and 54%, respectively) and a moderate effect size and power in pain (0.60 and 99%, respectively). Effect sizes for both groups in pain and function were deemed the same due to there being no interaction with ANOVA.

Figure 1

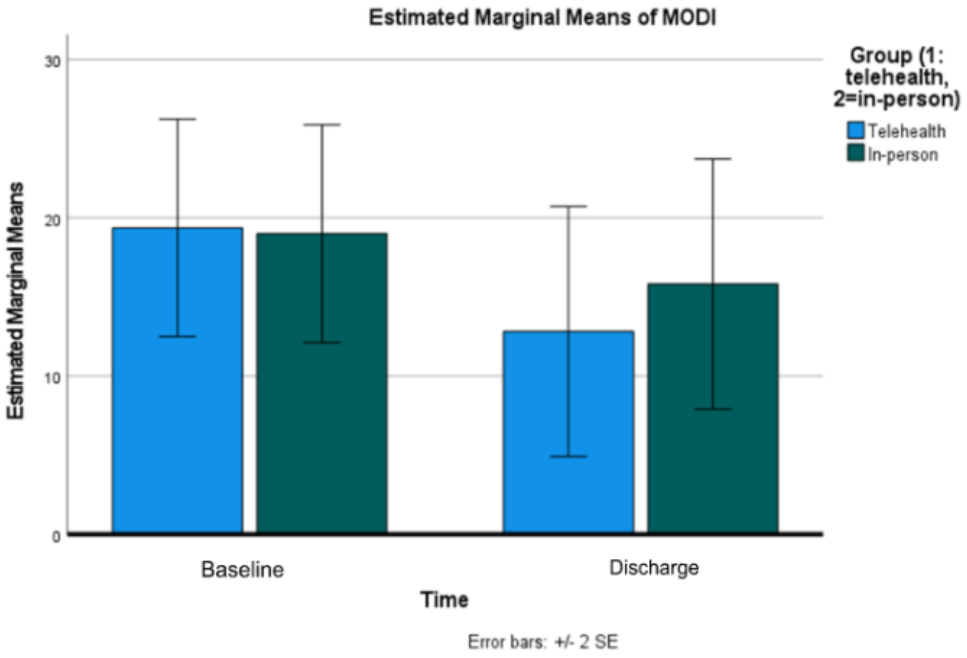
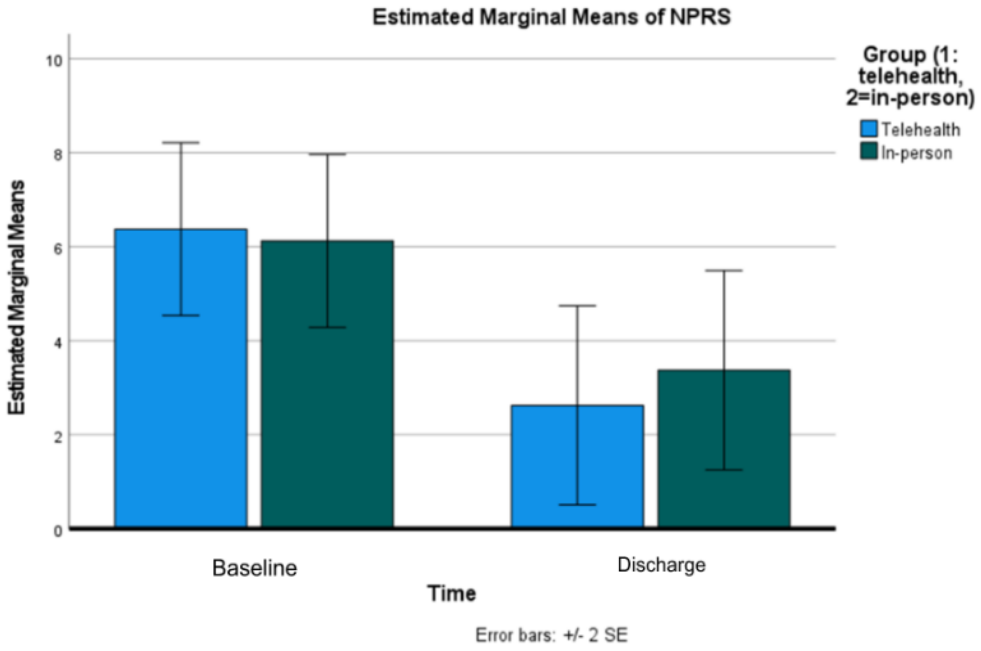


Figure 2



Figures 1 and 2 show the estimated marginal means of MODI and NPRS, respectively, and graphically show the stated changes.

Discussion

This retrospective case series evaluated the effectiveness of TPT compared to IPT on pain and disability in patients with NCLBP. The study demonstrates no differences in pain or disability between the two groups at baseline or discharge. Additionally, this study demonstrates meaningful decreases in pain after treatment within each group. Although the total number of patients reporting pain at discharge was less than those reporting disability, statistical power was stronger with pain, due to the limited variance between groups.

These results suggest that similar outcomes can be obtained when treating patients with NCLBP regardless of method of delivery of care. Although certain interventions were exclusively available to those who received IPT, including manual therapy and modalities, these may not have provided any additional benefit over the interventions that were available through telehealth. This coincides with current research on CLBP. According to clinical practice guidelines for low back pain, those who have CLBP respond best to initiation of exercise programs that include aerobic exercise.[37] Pain neuroscience education is another technique that has proven benefits with this population.[38] Because these interventions can be delivered via telehealth, this may indicate that other treatments that require in-person delivery (such as dry needling, manipulations, mobilizations, and ultrasound), may not be necessary for this population. Nonetheless, while these interventions may have been delivered to patients in both groups, the CPT codes provided to the authors do not specify what interventions were delivered. For instance, CPT code 97110 (therapeutic exercise) does not specify what types of exercises were performed nor whether they were aerobic in nature. Additionally, a specific CPT code for patient education was not reported for either group even though patient education on pain neuroscience may have been delivered throughout the episode of care.

Although there were no significant decreases in MODI scores within either group, the TPT group did surpass the MCID of 6 points for this outcome measure. On average, the TPT group decreased their scores by 6.55 points which is arguably more meaningful information for clinicians and patients as this signifies greater levels of function. The IPT group did not reach MCID for MODI as they only experienced an average decrease of

3.18 points. However, this outcome measure only had 54% power which means the study was at increased risk of committing a type 2 error and incorrectly accepting the null hypothesis. In other words, due to the lack of statistical power, the data analysis could have mistakenly shown no significant difference in MODI when in reality there was one. If greater power was achieved, perhaps it would show a greater decrease in MODI scores for both groups that would reach significance.

Both groups reached significance as well as MCID for the NPRS demonstrating that both methods of delivery resulted in meaningful decreases in patients' experience of pain. Because power was calculated at 99% for this outcome measure, the results for NPRS are more reliable than those of MODI.

This case series is not without its limitations. First, the authors were unable to establish a consistent plan of care within each group. As previously stated, although CPT codes were obtained, it still remains unclear as to which exact interventions were rendered. The authors also had no control over the chronicity of patients' back pain. Only five out of 27 patients reported chronicity of their pain, all of them were in the IPT group, and large variability existed between these patients. Studies suggest that the longer an individual is in pain, the poorer the prognosis for improvement.[39] Additionally, literature suggests NCLBP should be classified into different subcategories in order to provide more homogeneous samples, which is something that was not done in this study.[40] Another limitation of this study was the authors limiting their search exclusively to clinics that fall under the operation of APTP which decreases the generalizability of the results of this study. Expanding this search to other clinics in the nation would have increased sample size which in turn would have increased power. Because this study

was not adequately powered, it increases the likelihood of committing a type 2 error which incorrectly results in an acceptance of the null hypothesis when it should actually be rejected. The retrospective nature of this study makes it unable to limit confounding variables such as variability in treatment, mode of telehealth communication, competence of physical therapists in treating NCLBP, compliance of treatment by patients, and chronicity of NCLBP. Future studies should compare the effects of a standardized physical therapy plan on function and pain performed in-person versus using telehealth, with a third group receiving additional interventions not available with TPT. Furthermore, the studies should at least control for competence of physical therapists in treating NCLBP, mode of telehealth communication, compliance of treatment by patients, chronicity of NCLBP, and classification of NCLBP.

After discharge, patients were sent an email with the option to complete the Net Promoter Score, which is a single-question survey asking “How likely is it that you would recommend our company to a friend or colleague?”[41] Companies adopt this survey to assess patient satisfaction with their care.[41] The authors initially sought to assess these data to compare patient satisfaction between the two groups, but due to minimal responses, comparisons were unable to be made between the two interventions.

Conclusion

This retrospective case series evaluated the effectiveness of TPT compared to IPT on pain and disability in patients with NCLBP. The results suggest that TPT provides similar improvements on pain and function compared to IPT. However, due to confounding variables such as lack of standardized treatment plans and heterogeneity of chronicity of low back pain, more research is required to better verify the

effectiveness of this form of care. Future research should compare a standardized PT treatment plan performed in person versus through telehealth, control for aforementioned extraneous variables, and have adequate power to better distinguish effectiveness between TPT and IPT.

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Disclosure statement

All authors report no financial benefit from this research that could potentially bias conclusions.

Conflicts of interest

All authors report no conflicts of interest.

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