ORIGINAL REPORT

INFLUENCE OF MODIFIED WORK ON RECURRENCE OF SICK LEAVE DUE TO MUSCULOSKELETAL COMPLAINTS

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Objectives: Workers who carry out modified work during sick leave due to musculoskeletal complaints seem to return to full-capacity work earlier than colleagues not given modified work. This study evaluates whether modified work during sick leave also influences the recurrence of a new episode of sick leave.

Methods: Questionnaires on physical and psychosocial workload, musculoskeletal complaints, general health and sick leave were sent to 137 workers on sick leave for 2–6 weeks due to musculoskeletal complaints, shortly after full return to work, and 12 months after the first day of sick leave.

Results: Approximately 45% of the participants experienced a recurrence of musculoskeletal sick leave within 12 months after the start of the initial sick leave. Subjects who performed modified work during initial sick leave reported significantly less recurrence than those who had started immediately at full capacity. Musculoskeletal sick leave prior to the start of the study also predicted the recurrence of sick leave. Many workers reported residual health problems at the time of return to work, which in turn influenced recurrence of musculoskeletal sickness absence.

Conclusion: This study suggests that, although full recovery of musculoskeletal complaints was not established at the time of return to work, workers who had performed modified work had a lower risk of recurrence of musculoskeletal sick leave than those who had returned directly to full duties.

Key words: modified work, musculoskeletal complaints, recurrence of absence.

INTRODUCTION

In the past few decades various intervention programmes have been developed to facilitate early return to work after sickness absence due to musculoskeletal disorders. These programmes are often multifactorial in nature and combine medical and non-medical interventions. Comprehensive multidisciplinary interventions have a documented effect on pain intensity and associated functional limitations, but the evidence on effectiveness on return to work is limited (1, 2). Most guidelines on musculoskeletal disorders, especially those on low-back pain, emphasize that musculoskeletal pain is a self-limiting condition and that, hence, an (early) return to work should be encouraged (3). A crucial element in return to work interventions is gradually increasing the workload until full duties are commenced, whereby reduction of workload is achieved by modifying the content and duration of strenuous tasks and activities at work (4).

In 2 reviews it has been concluded that workers on temporarily modified work have a higher probability of return to work earlier at full capacity than colleagues without modified work (4, 5). However, these reviews included interventions varying from modified work as sole intervention to multidisciplinary rehabilitation programmes including modified work. Recent studies on the isolated effect of modified work on musculoskeletal sickness absence did not observe any effect on return to work (6, 7). In addition, few studies have documented what happens after return to work at full capacity. This is important, since it has been shown that many subjects who returned to work were not fully recovered from their initial complaints (8–10). Several studies have reported recurrence of musculoskeletal sick leave up to 38% per year (11–16). It has been suggested that the high recurrence of musculoskeletal sick leave is partly due to a too early start with modified work. Aggressive promotion of early return to work could yield the opposite result, with an increased likelihood of recurrence when job accommodation was not satisfactory (9). On the other hand, prolonged work disability may lead to an increased reconditioning, requiring a greater accommodation effort than employers are either able or willing to provide, and therefore also increasing the risk of recurrence (17).

Given the paucity of information on recurrence of musculoskeletal sick leave after return to work, a longitudinal study among workers on sick leave due to musculoskeletal complaints was performed with the primary aims of describing the likelihood of recurrence of sickness absence and evaluating the impact of modified work and other risk factors on recurrence of sickness absence.

METHODS

Study design and population

Workers on sick leave for 2–6 weeks due to musculoskeletal complaints were enrolled in the study by occupational physicians during their first

consultation, or selected from the absenteeism register of 2 occupational health services with various local offices. In the Netherlands it is standard practice to be called up by an occupational physician after 2 weeks of sick leave and at 6 weeks there is a statutory requirement that worker and employer agree upon a written rehabilitation plan. Based on the initial diagnosis by the occupational physician, workers were excluded from the study if they had a specific underlying pathology, such as fracture or prolapsed disc. If the worker on sickness absence was willing to participate, an informed consent was signed. Participants received a diagnosis-specific questionnaire (i.e. low back, hip, knee, ankle/foot, neck, shoulder, or wrist/hand/elbow) to be returned to the research team. This baseline questionnaire gathered information on different dimensions of health, individual characteristics, and work-related factors. Subjects received a first follow-up questionnaire when return to work at full capacity was established at the discretion of the occupational physician. This second questionnaire repeated the questions on health dimensions and asked questions on modified work performed during sick leave. Approximately 12 months after the first day of the initial sick leave, a third questionnaire was sent, specifically addressing recurrence of any absence due to musculoskeletal complaints. The medical ethics committee of the Erasmus MC, Rotterdam approved the study.

Modified work

The presence of modified work during sick leave was established in the second questionnaire. If modified work was indeed part of the period of sickness absence, specific questions were set about the content and circumstances of modified work. The presence of modified work was defined by 3 criteria: (*i*) work activities at the workplace were carried out during sickness absence, but workers were on restricted duty; (*ii*) these activities were characterized by a substantial reduction in physical load through adjusted work tasks and/or working hours; and (*iii*) the modified work was officially advised by the occupational health physician (6). In the Netherlands modified work is commonly offered to workers on sick leave in order to use their rest capacity to work. These work activities on restricted duty are legally defined as part of the sick leave period. Sick leave ends when workers return to their original job at full capacity or they have changed job. Modified work is comparable to concepts such as part-time sick leave and work restrictions (4, 7).

Sickness absence

The first day of sickness absence and the date of return to full duties were obtained from occupational health services, based on the legal requirement to register the start and end of an episode of sickness absence. In the Netherlands in almost all situations the worker will be paid a full salary during the first year of sickness absence. Recurrence was defined as a new episode of musculoskeletal sick leave after the worker had returned to full capacity work for at least one complete work day. This new absence period could occur due to the original complaints or due to other musculoskeletal complaints. The information on recurrence was retrieved from the third questionnaire after 12 months of follow-up, which included questions about occurrence of a period of absence due to the original diagnosis as well as absence due to other musculoskeletal complaints. Workers were asked about the primary reason underlying their sick leave and about musculoskeletal co-morbidity. Duration of recurrence of absence was noted on a 4-point scale: 0 days, 1–7 days, 8–14 days, and more than 2 weeks (18).

Measurement of health and risk factors

All 3 questionnaires determined disease-specific and generic health measures. A detailed description of the interrelationships of the health measurements applied has been published previously (19). The Nordic Questionnaire for the nature and severity of musculoskeletal complaints was used to define the presence of musculoskeletal complaints. A chronic complaint was defined as pain present almost every day in the preceding 12 months with a minimal presence for at least 3

months (6). A Numerical Rating Scale was used, ranging from 0 (no pain at all) to 10 (pain as bad as it can be), for pain as measure of the intensity of musculoskeletal complaints (20). The sum-score of the 24 dichotomous items in the Roland-Morris Disability Questionnaire defined functional limitations due to low back pain (21). For other musculoskeletal complaints a comparable questionnaire was used, derived from the Sickness Impact Profile (22). General health was measured with the short-form 12 and the answers on the 12 items were aggregated into the physical component summary scale and the mental component summary scale. Each component was expressed on a 0 (worst health status possible) to 100 (best health status possible) scale (23). The EuroQol 5 dimensions were used as a measure of preference based quality of life, using weights for different health states as obtained from the general population in the UK, to calculate the quality of life score ranging between 0 and 1 (24).

At baseline, information was collected about age, gender, body mass index, marital status, education, and physical and psychosocial workload. The questions on physical load at work had a 4-point ordinal scale and the answers "always" and "often" were classified as exposure (25). The Job Content Questionnaire was used for the psychosocial dimensions work demands, skill discretion, and decision authority (26). Work demands were measured by 11 questions related to working fast, working hard, excessive work, insufficient time to complete the work, and conflicting demands. Skill discretion and decision authority were measured by 6 and 11 questions pertaining to aspects such as required skills, task variety, learning new things, and amount of repetitive work. All items had a 4-point ordinal scale ranging from 0 (never) to 3 (always) and a sum-score across all items in each dimension was calculated (26).

Statistical analysis

Differences between continuous variables were tested with the Student's *t*-test and differences between dichotomous variables with the χ^2 test. The generic measures of health were used as continuous variables, after ensuring that these variables were normally distributed. The sum-score of the functional limitation scale was based on 24 dichotomous items and treated both as continuous variable as well as ordinal variable with cut-off values based on tertile scores of the study population distribution.

The risk factors for recurrence of sick leave due to musculoskeletal complaints were analysed with logistic regression analysis. Independent variables were individual characteristics, work-related factors, and health-related measures. The variables with a significance level of $p < 0.20$ in the univariate analyses were considered for inclusion in the multivariate model, and variables with $p < 0.05$ were retained in the final multivariate model. Age was included in the multivariate model by default, independent of its level of significance. An odds ratio (OR) above 1 indicates an increased likelihood of recurrence of a sickness absence period due to musculoskeletal complaints.

RESULTS

Occupational health physicians included 196 respondents on sick leave for 2–6 weeks with non-specific musculoskeletal complaints. Another 116 workers were selected from absenteeism registers from occupational health services and 66 subjects agreed to participate in the study (57%). In total, 262 workers received the baseline questionnaire, of whom 225 subjects returned a complete questionnaire (86%). Most of the respondents were blue-collar workers from a wide range of companies, including construction industry, postal delivery services, food services, security firms, and nursing homes and hospitals. The first follow-up questionnaire shortly after return to full-time work was completed by 158 (70% of baseline

participation) subjects. The non-response ($n=67$) was due to loss to follow-up ($n=40$), permanent change of job towards less strenuous activities immediately after the date of full recovery ($n=21$), and subjects ($n=6$) who did not return to work within 12 months after the start of the initial sick leave episode. Non-response was not influenced by mode of enrolment or branch of industry. The second follow-up questionnaire after 12 months was completed by 137 workers (61% of baseline participation).

Table I describes the characteristics of the workers on sick leave for 2–6 weeks. In total, 48% were diagnosed by the occupational physician with back pain, 30% with upper extremity complaints, 19% with lower extremity complaints, and 3% with miscellaneous musculoskeletal complaints. During the initial sick leave period, approximately 80% of all subjects reported also having experienced other musculoskeletal complaints. Workers returning to full-capacity work after having performing modified duties, 39% reported at baseline less often physical load at work and also less often the presence of chronic musculoskeletal complaints in the 12 months prior to the initial sick leave.

The mean follow-up period after return to full-capacity work in the regular job was approximately 9 months. During this period approximately 45% ($n=66$) of participants experienced a recurrence of sick leave due to musculoskeletal complaints. Subjects who had performed modified work during their initial sick leave experienced significantly less recurrence of musculoskeletal sick leave than those who had started immediately at full capacity (Table II). In 19 out of 66 episodes (29%) workers attributed their recurrent sick leave to both the musculoskeletal complaint of the initial sick leave and to other musculoskeletal complaints.

Table III shows the risk factors for musculoskeletal sick leave during the follow-up period. Return to work after modified work was associated with less recurrence (OR=0.35, 95% confidence interval (95% CI) 0.16–0.78). Musculoskeletal sick leave in the 12 months prior to the initial sick leave period increased the probability of recurrence (OR=3.35, 95% CI 1.36–8.24). Prolonged standing and heavy lifting were inversely associated with recurrence, but due to the strong inverse correlation between both work-related risk factors, only prolonged standing (OR=0.34, 95% CI 0.20–0.94) remained statistically significant in the multivariate model, whereas lifting was of borderline significance ($p=0.09$). Among the health measures shortly after return to work, functional limitations and general physical health predicted recurrence, but after adjustment for other risk factors neither health measure was statistically significant ($p>0.10$). With categorization into tertiles, workers with the highest and intermediate levels of functional limitations had significantly increased risks on recurrence, with OR of 2.64 (95% CI 1.12–6.21) and 2.80 (95% CI 1.17–6.69), respectively, compared with workers without or with low levels of functional limitations. However, in the multivariate analysis these associations become statistically insignificant, with ORs of 2.26 (95% CI 0.88–5.77, $p=0.37$) and 2.47 (95% CI 0.94–6.46, $p=0.24$).

Table I. *Characteristics of workers on sick leave for 2–6 weeks due to non-specific musculoskeletal complaints at the start of the study, and health assessments at start of the study and at return to work (RTW) at full capacity (n = 137)*

Characteristics	Modified work ($n=54$)	No modified work ($n=83$)
Age, years, mean (SD)	43 (7)	44 (7)
Sex, female, n (%)	25 (46)*	24 (29)
Lower education, n (%)	32 (59)	47 (57)
Marital status, single, n (%)	16 (30)*	10 (12)
Prolonged standing, n (%)	39 (74)*	36 (44)
Frequently lifting 10–25 kg, n (%)	24 (44)*	54 (67)
Frequently lifting >25 kg, n (%)	13 (24)*	52 (63)
Frequently kneeling, n (%)	8 (15)*	25 (30)
Frequently arms above shoulders, n (%)	10 (19)*	29 (36)
Skill discretion, mean (SD) (0–18)[1]	10 (4) #	8 (3)
Decision authority, mean (SD) (0–33)[1]	16 (7)	16 (7)
Work demands, mean (SD) (0–33)[1]	15 (5)	14 (5)
Less good relationships with colleagues, n (%)	16 (30)*	48 (58)
Less good relationships with supervisor, n (%)	25 (46)	36 (44)
Chronic musculoskeletal complaint in past 12 months, n (%)	9 (17)*	29 (35)
Musculoskeletal sick leave in past 12 months, n (%)	18 (33)	17 (20)
Severity of pain, baseline, mean (SD) (0–10)[1]	6 (2)	6 (2)
Severity of pain, RTW, mean (SD) (0–10)[1]	4 (3)	5 (3)
Functional limitations, baseline, mean (SD) (0–24)[1]	13 (5)	13 (5)
Functional limitations, RTW, mean (SD) (0–24)[1]	7 (5)	7 (6)
General physical health, baseline, mean (SD) (0–100)[2]	32 (7)	32 (7)
General physical health, RTW, mean (SD) (0–100)[2]	44 (9)	43 (9)
General mental health, baseline, mean (SD) (0–100)[2]	52 (10)	50 (12)
General mental health, RTW, mean (SD) (0–100)[2]	55 (8)	53 (10)
Quality of life, baseline, mean (SD) (0–1)[2]	0.5 (0.3)	0.5 (0.3)
Quality of life, RTW, mean (SD) (0–1)[2]	0.8 (0.2)	0.7 (0.2)

*χ^2 test, $p<0.05$, #t-test, $p<0.05$.
[1]A higher score indicates a worse health status.
[2]A higher score indicates a better health status.
SD: standard deviation.

Table II. *Recurrence of sick leave due to non-specific musculoskeletal complaints during the follow-up period, stratified by having performed modified work during initial sick leave (n = 137)*

Recurrence	Modified work ($n=54$)	No modified work ($n=83$)
Recurrent episode of sick leave due to any musculoskeletal complaint	18 (34)*	48 (58)
Recurrent episode of sick leave primarily due to the same musculoskeletal complaint	15 (29)	29 (36)
Recurrent episode of sick leave primarily due to another musculoskeletal complaint	11 (20)*	30 (37)

*χ^2 test, $p<0.05$.

Table III. *Risk factors for recurrence of sick leave due to non-specific musculoskeletal complaints during the follow-up period (n=137) as determined by logistic regression analysis*

	Univariate associations		Multivariate model	
Risk factor	OR	95% CI	OR	95% CI
Individual characteristics				
Age 40 years or older	0.84	0.41–1.73	0.76	0.34–1.67
Sex, female	0.72	0.36–1.45	n/a	
Lower education	0.99	0.50–1.96	n/a	
Marital status, single	0.50**	0.21–1.22	(0.57	0.21–1.53)[1]
Work-related factors				
Modified work	0.37*	0.18–0.75	0.35*	0.16–0.78
Prolonged standing	0.43*	0.21–0.86	0.43*	0.20–0.94
Frequent lifting 10–25 kg	1.21	0.61–2.42	n/a	
Frequent lifting >25 kg	2.27*	1.14–4.56	(2.03	0.90–4.58)[1]
Frequent kneeling	0.98	0.45–2.15	n/a	
Frequently arms above shoulders	1.53	0.72–3.24	n/a	
Skill discretion (per unit)	0.82	0.42–1.61	n/a	
Decision authority (per unit)	0.72	0.38–1.41	n/a	
Work demands (per unit)	1.14	0.58–2.24	n/a	
Less good relationship with colleagues	1.60**	0.81–3.15	n/a	
Less good relationship with supervisor	1.05	0.53–2.06	n/a	
Health measures				
Chronic complaints in past 12 months	2.83*	1.29–6.22	(1.48	0.62–3.56)[1]
Musculoskeletal sick leave in 12 months before initial sick leave	2.04**	0.93–4.46	3.35*	1.36–8.24
Severity of pain at RTW (per unit)	1.06	0.93–1.20	n/a	
Functional limitations at RTW (per unit)	1.06**	0.99–1.12	(1.05	0.98–1.12)[1]
General physical health at RTW (per unit)	0.97**	0.93–1.01	(0.96	0.91–1.02)[1]
General mental health at RTW (per unit)	1.00	0.97–1.04	n/a	
Quality of life at RTW (per unit)	0.59	0.12–2.86	n/a	

*Wald χ^2 test, $p<0.05$, **Wald χ^2 test, $0.05 \leq p<0.20$.
[1]Effect of risk factor when included in the multivariate model.
n/a: not included in the final multivariate model; OR: odds ratio; CI: confidence interval, RTW: return to work.

DISCUSSION

This study among workers on sick leave due to musculoskeletal complaints showed that approximately 45% experienced a recurrence of musculoskeletal sick leave within 12 months after the start of the initial period of sick leave. Subjects who performed modified work during initial sick leave reported significantly less recurrence than those who had started immediately at full capacity. Musculoskeletal sick leave in the 12 months prior to the start of the study was a strong predictive factor for recurrent sick leave.

This prospective study has several limitations. First, the results could have suffered from confounding, i.e. workers who performed modified work during their initial sick leave were generally in better health and, thus, it is expected that these workers are less likely to have a recurrent episode. Additional analysis showed that workers who had performed modified work reported better mental health at baseline, but this health measure was not predictive for recurrence of sick leave. At baseline no differences were observed for physical health and functional limitations, which were predictive for recurrence, albeit not statistically significant. Hence the decision of the occupational physician to assign a sick-listed worker to modified work was not influenced by the health measures that predicted recurrence of sick leave. Modified work was more often assigned to workers who did not undertake frequent lifting of heavy loads as part of their job activities (Table I) and frequent lifting over 25 kg was also a risk factor for recurrence of musculoskeletal sick leave in the univariate analysis (Table III). However, the estimate of the effect of modified work on recurrence did not change after adjustment for frequent lifting over 25 kg and, thus, this differential allocation of modified work will not have confounded the results to a large extent.

A second limitation is that the information on recurrence of sick leave could not be retrieved from company-based registries, but was based on self-reports of recurrence of sick leave and its underlying complaints. Self-reports on sick leave are less reliable for short periods of absence (18). Also, the self-assigned musculoskeletal cause may have been influenced by the initial sick leave, whereby workers may attribute a new episode of sick leave more often to a musculoskeletal cause, resulting in an overestimation of the recurrence.

A third limitation was the response and loss-to-follow-up. At baseline, 2 methods of enrolment were used. A substantial proportion of the subjects were selected from the absenteeism register of 2 occupational health services and approached directly by the research team. These employees had a response of 57% at inclusion, which was partly explained by subjects who had already returned to work when receiving an invitation to participate in the study. For the enrolment through occupational physicians, it was not possible to estimate the eligible number of participants, since it was not recorded by the occupational health services which workers attended their scheduled appointment and which were asked during the consultation to participate in the study. However, the route of entry in the study population, whether through an occupational physician or through a sick leave register, was not associated with the health status at baseline and also was not a factor influencing the return to work and/or the possibilities of having performed modified work. The loss-to-follow-up during the initial sick leave period was 30% and the additional loss during follow-up after initial return to work was 13%. Neither the initial loss nor the additional loss was influenced by baseline characteristics or characteristics at initial return to work.

The study population of workers on sick leave for 2–6 weeks had pain intensity, functional limitations and general health comparable with that of workers on sick leave due to back pain between 7 and 12 weeks (10, 27–28). Within this population 45% of the workers experienced a recurrence of musculoskeletal sick leave within the follow-up period, which was on average approximately 9 months. A similar recurrence of 38% over 6

months was reported among Canadian workers (12). When limiting the definition of recurrence to the specific musculoskeletal complaint underlying the initial sick leave, recurrence was 32%, which is slightly higher than previous reports on recurrence of 19%–24% among workers on sick leave for back pain (11, 14–17). However, in these studies a substantial part of the employees with musculoskeletal complaints had already returned to work within 2 weeks. Since our study population consisted of workers on sickness absence for 2–6 weeks at the time of inclusion, we have selected the more severe cases of sick leave and this may partly explain the higher recurrence. The high recurrence is also expressed in the highly predictive value of a musculoskeletal sick leave in the 12 months prior to the initial sick leave (14). Interestingly, in our analysis the duration of the initial sick leave was not associated with a higher likelihood of recurrence and also did not influence the magnitude of risk factors for recurrence. Hence, the differences among workers with shorter and longer periods of initial sick leave at risk for recurrence did not influence the results presented.

This study showed that recurrence of musculoskeletal sick leave is not always related to the original complaint, since a substantial part of recurrence was attributed to another musculoskeletal complaint. Other studies have pointed at the considerable overlap between musculoskeletal pain experienced in different sites and at the high prevalence of co-morbidity of neck and upper extremities with low back pain (29–30). For some patients musculoskeletal complaints express the presence of chronic widespread pain, which may be driven by a central process of sensitization (29, 31). This may explain the observed cross-over of localized musculoskeletal causes of sick leave. In future epidemiological studies on musculoskeletal sick leave it is advised to study interrelations among specific musculoskeletal causes of sick leave.

Workers who performed modified work during sick leave had a lower risk of recurrence of musculoskeletal sick leave. A similar indication was found in a study among employees of a utility company in the USA, where workers on back pain sick leave with work restrictions set by the occupational physician were at lower risk for recurrence than workers without work restrictions (7). Evidence that the provision of modified work may reduce the duration of initial sick leave has been presented in 2 recent reviews (4, 5). Our study suggests that modified work also has beneficial long-term effects. A possible explanation for this finding is that employees on modified work during sick leave will learn how to cope with their musculoskeletal problems while at work and, hence, are less prone to take absence again during a recurrent period of their musculoskeletal complaints.

The effects of physical load on recurrence showed that prolonged standing remained statistically significant in the multivariate model, whereas frequent lifting of heavy loads was no longer included in the final model. This has to be interpreted with caution, since prolonged standing and frequent lifting had a reverse association and the OR of frequent lifting only changed from 2.27 to 2.03 (i.e. by less than 11%). Since a wide array of jobs was involved in this study, no attempt was made to confirm the self-reported exposure to physical load by workplace visits.

The assessment of musculoskeletal and generic health at time of return to work showed that most workers still had complaints when returning to full duty. Worse physical health was of borderline statistical significance ($p < 0.10$) in the prediction of a recurrent period of absence and worse functional limitations were significant when comparing workers with higher levels against those without, or with minor limitations. The importance of general health, physical health, and functional limitations for recurrence has been stressed in several studies (12, 16, 32). However, the observation that these health measures did not contribute to the predictive power in the multivariate analysis is an indication that recurrence will be partly explained by coping strategies. Modified work may increase the awareness of the worker that it is possible to continue working despite musculoskeletal complaints and, as such, contributes to effective coping with complaints. Several studies have shown that coping styles and beliefs in control over pain can influence the treatment outcomes for patients with low back pain (33, 34). These coping styles may differ across individual characteristics and socio-economic position (35), which should be taken into account when supporting workers to return to work. In addition, coping could be influenced by job characteristics not included in this study and work organization factors, such as machine-paced work and team-based production systems.

Return to work is not equal to full recovery from musculoskeletal complaints. In this study many workers reported residual health problems at the time of return to work, which in turn influenced recurrence of musculoskeletal sickness absence. A longitudinal study among workers with a lost-time claim injury due to a back or upper extremity disorder showed that workers with a sustained return to work reported better health and less functional limitations than those who experienced a recurrence of work absence (12). Another study among workers on musculoskeletal sick leave demonstrated that pain, functional limitations, and general health were improved at the time of return to work, but also improved again significantly in the first months at work (36). These findings suggest that additional medical guidance is needed for workers after return to full duties in order further to improve their musculoskeletal health and reduce the risk of recurrence of sick leave. This guidance should incorporate coping strategies, but should also address residual pain and functional limitations through work-place prevention programmes (37).

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