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Wandering, verbally and physically abusive behaviour and their relation with pain in nursing homes residents

Etudiant
Nathalie Manasseh

Tuteur
Prof. Armin von Gunten
Service universitaire de psychiatrie de l'âge avancé, CHUV

Co-tuteur
Jean-Philippe Antonietti,
Institut de Mathématiques Appliquées, Université de Lausanne

Expert
Prof. Christophe Büla
Service de gériatrie et réadaptation gériatrique, CHUV

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Abstract

Backgrounds:

Behavioural and psychological symptoms of dementia (BPSD) include, among others, hallucinations, delusions, depression, euphoria, agitation, aggression, sexual desinhibition, sleep disturbances, and apathy (1).

To our knowledge, surprisingly few studies looked into the possible association between pain and BPSD in nursing home residents. Given this dearth of studies, we wondered whether or not there is an association, in nursing home residents, between pain and BPSD, in particular wandering as well as verbally and physically abusive behaviour, and whether or not this possible association changes with the degree of cognitive impairment.

Method:

All nursing home residents in the three Swiss cantons Aargau, Basel-City, and Solothurn (corresponding to 13.5% of the total Swiss population) receive a Resident Assessment Instrument Minimum Data Set (RAI-MDS) assessment within the first two weeks upon entry. This yielded a total sample of 16'430 nursing home residents considering that the residents' assessment took place between 1997 and 2007 and that we only took into account the admission RAI-MDS assessment. Only residents for whom data on pain was recorded were included in the study (n = 16'183).

Results:

Wandering correlated significantly with pain although the effect size was small (Spearman correlation coefficient = 0.052; p = 0.000), a result very similar to that found for VAB (Spearman correlation coefficient = 0.034; p = 0.000) and PAB (Spearman correlation coefficient = 0.043; p = 0.000). Likewise, using linear regression analyses, pain was very significantly associated with any of the three BPSD considered, but it predicted astonishingly little of the variance observed (wandering: B = 0.036; p = 0.000; R^2 = 0.002; VAB: B = 0.021; p = 0.000; R^2 = 0.001 PAB: B = 0.012; p = 0.000; R^2 = 0.001). The interaction of pain and cognition had a significant effect on the three BPSD, suggesting that cognition was a moderator of the relationship between pain and all three behaviours.

Conclusion:

Wandering behaviours, VAB and PAB seem to be predicted by many factors. Although pain predicts only a small part of variance of these behaviours, it still remains important to recognise and treat pain in order to reduce these behaviours at least a little both in intensity and frequency. Given the dearth of studies and their somewhat contradictory results, further studies ought to investigate the role, the type and localisation of pain might play on the expression of different BPSD or how residents suffering from dementia perceive pain.

Keywords: **pain, cognitive impairment, BPSD, nursing homes.**

Wandering, verbally and physically abusive behaviour and their relation with pain in nursing homes residents

Manasseh N, Antonietti JP, von Gunten A

Introduction

Behavioural and psychological symptoms of dementia (BPSD) include, among others, hallucinations, delusions, depression, euphoria, agitation, aggression, sexual desinhibition, sleep disturbances, and apathy (1). Within the agitation and aggression clusters, wandering, verbally and physically abusive behaviours are particularly frequent disruptive behaviours (2; 3). Wandering is defined as strolling without a goal and without consideration of one's own security or capability. Residents with verbally abusive behaviour threaten, yell or curse at others. Physically abusive behaviours refer to hitting or kicking at others, scraping or molesting others (4).

A number of causes and risk factors for BPSD have been described. Whether or not they depend on the type of BPSD remains unclear and findings are somewhat contradictory (5).

However, *wandering* in nursing home residents was positively associated with memory problems, dementia, pneumonia, anxious mood, sad or pained expression, constipation and antipsychotic medication, whereas increased functional impairment and female gender were associated with less wandering (6). Male gender, use of neuroleptics, duration of dementia, cognitive function, moderate to severe depression, delusions, hallucinations, and sleep disturbances were associated with wandering behaviours unlike general health (2). Wandering was more present in patients with Alzheimer's disease than in those with vascular or other types of dementia (2), suggesting that differentially impaired neural circuits may lead to wandering (7), of which a functional dysbalance between hippocampal, frontal or parietal cortex may be of importance (8). Furthermore, wandering could be the expression of needs and result from the interaction of personal and environmental attributes as suggested by the association of wandering with low or absent noise and inadequate lighting (9). All the previous studies agree on the fact that wandering is associated with the severity of cognitive impairment (2; 6; 7; 8).

Aggressive behaviours are related to severe dementia and bad quality of social interactions, although Cohen-Mansfield et al. (9) were unable to determine whether these social interactions were a cause or an effect of aggressive behaviour, probably because both is at times true. *Verbally agitated behaviour* was associated with bad health, depressed affect, bad quality of social interactions, and the absence of dementia (9). These authors later described further characteristics associated with verbally agitated behaviours which include female gender, cognitive impairment, poor performance in activities of daily living, and, once more, impaired social functioning

(10). *Verbally abusive behaviour* (VAB) was more frequent in APOEε4-positive nursing homes residents with dementia compared to those with no APOE ε4 allele » (11). *Physically aggressive behaviour* was related to the presence of depression, delusions, hallucinations and constipation (12). There are few studies interested in physically abusive behaviours (PAB), most of them making no distinction between verbal and physical aggressiveness.

Previous studies show contradictory results as to the *association between pain and behavioural symptoms* except for the fact that almost all studies confirm the important role of dementia in the occurrence of BPSD in nursing home residents.

There are few studies investigating the possible relationship between *pain and wandering*. However, patients in nursing homes expressing sadness or pain had an increased risk for developing wandering behaviours (6). Dementia, constipation and the use of antipsychotic medication were also risk factors for developing this type of behaviour (6).

Making no distinction between verbally and physically abusive behaviours, Oh et al. (3) study aggression and report an association with pain as well as age, cognitive impairment, and duration of stay in a nursing home. Residents who were older had greater cognitive impairment and more pain. Those who stayed longer in a nursing home were more aggressive than the others. In another study on possible risk factors or characteristics of people with verbally or physically aggressive behaviours, depression had the strongest association with both of these behaviours. However, associations were also found with delusions, hallucinations, and constipation, the latter one being related only to physical aggression (12). As for wandering, very few studies interested in the relationship between pain and PAB can be found. Most studies did not distinguish physically from verbally abusive behaviours. The only study we found showed that PAB was not related to pain, a somewhat counterintuitive finding according to the authors (12).

To our knowledge, surprisingly few studies looked into the possible association between pain and BPSD in nursing home residents. Given this dearth of studies and according to the above short review, we wondered whether or not there is an association, in nursing home residents, between pain and BPSD, in particular wandering as well as verbally and physically abusive behaviour, and whether or not this possible association changes with the degree of cognitive impairment.

Method

Subjects

All nursing home residents in the three Swiss cantons Aargau, Basel-City, and Solothurn (corresponding to 13.5% of the total Swiss population) receive a Resident Assessment Instrument Minimum Data Set (RAI-MDS)

assessment within the first two weeks upon entry. We obtained the authorization of the Qualitäts-Systeme Aktiengesellschaft (Q-Sys AG; Systeme zur Qualitäts- und Kostensteuerung im Gesundheitswesen) that pools all RAI-data, as well as of all directors of the nursing homes involved in this study to use this data for anonymous research purposes. Ninety of 160 nursing homes invited accepted participating in the study. This yielded a total sample of 16'430 nursing home residents considering that the residents' assessment took place between 1997 and 2007 and that we only took into account the admission RAI-MDS assessment. Only residents for whom data on pain was recorded were included in the study (n = 16'183): 1) no pain (n = 8'566); 2) mild pain (n = 2'353); 3) moderate pain (n = 2'233); 4) moderately severe pain (n = 2'599); or 5) very severe pain (n = 432).

Measures

Trained professionals assessed each resident upon admission to the nursing home with the Swiss version of the RAI-MDS for nursing homes, Version 2.0 1996 (13; 14). The MDS-pain scale was used to screen for pain. The MDS-pain scale defines five features including 1) no pain, 2) mild pain, 3) moderate pain, 4) moderately severe pain and 5) very severe pain.

VAB was considered, depending on the analyses, either as a dichotomic variable as either present or absent, or as an ordinal variable taking into account the frequency of VAB occurrence that varied between 'no VAB', VAB present on 1-3 days a week, VAB present 4-6 days a week, or VAB present almost daily during a week. However, this frequency measure does not take into account the changeability of VAB during the day. Therefore, a severity scale taking into account both frequency and changeability was defined as follows: 0 = no VAB; 1 = VAB present on 1-3 days a week and easily changed; 2 = VAB present on 1-3 days a week and difficult to change OR VAB present on 4-6 days a week but easily changed; 3 = VAB present on 4-6 days a week and difficult to change OR VAB present almost daily but easily changed, and 4 = VAB present almost daily and difficult to change. Both PAB and wandering were defined in analogy to VAB, taking frequency and changeability into account as described above.

The cognitive impairment scale corresponds to the MDS cognitive scale (15) and it is derived from the Cognitive Performance Scale (16). It ranges from 1 = no impairment to 4 = severe impairment.

Independent variables considered a priori in this study were:

1) Age, 4 categories (≤ 64 years, 65-79, 80-90, > 90 years)
2) Gender, 2 categories (female, male)
3) Civil status, 2 categories (single vs. married)
4) Smoking, 2 categories (smokers vs. non-smokers)
5) Constipation (yes vs. no)
6) Alcohol habits, 2 categories (alcohol habits vs. no alcohol habits)
7) Sleep disorders (yes vs. no)

8) MDS cognitive scale, 4 categories (1=no impairment to 4=severe impairment)
9) Depression, 14-item scale
10) Continence, 2 categories (continence vs. any incontinence (urinary and / or faecal))
11) Mobility, 5 categories corresponding to the MDS-HSI index (Minimal Data Set - Health Status Index)
12) Number of drugs taken upon admission, 5 categories (no drug taken, 1 drug taken, 2-5 drugs taken, 6-10 drugs taken, > 10 drugs taken)
13) Total number of recorded diseases

The data included in this analysis were anonymised, i.e. they did not allow any connection to a particular person in a specific nursing home and therefore submission to a research ethics committee was not required. However, this research was approved by the Internal Review Board of the Swiss Society for Old-Age Psychiatry.

Analyses

The Statistical Package for Social Sciences (Version 18.0) was used. Frequencies, means and standard deviations were calculated where appropriate. Exploratory frequency analyses were carried out to determine the subjects' characteristics and prevalence data for all dependent and independent variables. Chi square tests were used to study associations between pain and the independent variables considered in this study. The data were standardized before using univariate linear regression analyses with pain being the independent and each specific BPSD – i.e. wandering, VAB, PAB - being the dependant variable. The degree of cognitive impairment was then taken into account to examine whether or not cognition was a moderating factor of the 'pain - specific BPSD' relationship. To do so, we used multiple linear regressions, entering the product of the moderating variable (cognition) and the independent variable (pain) into the equation, each BPSD being the dependant variable. Subsequently, those independent variables that significantly correlated with pain were also entered into the multiple linear regression models (marital status, constipation, incontinence, mobility, number of diseases and depression) with each BPSD as the dependent variable. Given the large sample size, the minimal significance level was set at 0.001 (17).

Results

Subjects' characteristics

The subjects' characteristics as stratified according to the level of pain are shown in Table 1.

[INSERT TABLE 1]

47.1% of the residents were suffering from some degree of pain, 13.7% had wandering behaviour, 12.5% showed verbally and 4.2% physically abusive behaviour. 70.3% were cognitively impaired, moderately for the most. Pain was highly significantly related to being married, constipation, incontinence, reduced mobility, an increasing number of diseases as well as being depressed (cf. Table 1).

'Pain – specific BPSD' relationship

Wandering correlated significantly with pain although the effect size was small (Spearman correlation coefficient = 0.052; p = 0.000), a result very similar to that found for VAB (Spearman correlation coefficient = 0.034; p = 0.000) and PAB (Spearman correlation coefficient = 0.043; p = 0.000). Likewise, using linear regression analyses, pain was very significantly associated with any of the three BPSD considered, but it predicted astonishingly little of the variance observed (wandering: B = 0.036; p = 0.000; R^2 = 0.002; VAB: B = 0.021; p = 0.000; R^2 = 0.001 PAB: B = 0.012; p = 0.000; R^2 = 0.001).

Moderating effect of cognition on the 'specific pain – BPSD' relationships

Pain and cognition together explained 4.5% of the observed variance of wandering and only 1.1% for VAB, and 1.2% for PAB. Cognition was a significant predictor of wandering while pain dropped as a significant predictor of this behaviour when both cognition and pain were entered into the regression equation (cf. Table 2 for numeric results).

[INSERT TABLE 2]

Similarly, pain dropped as a significant predictor of VAB after entering cognitive impairment into the equation. The same held true for PAB. Furthermore, we considered each level of cognition separately using, again, linear regression modelling. Doing so, pain was a predictive factor of all three BPSD considered in the cognitively normal residents of this sample although it explained only 2.7% of the variance for wandering, 0.4% for VAB, and 0.5% for PAB. However, when cognition was impaired (MDScog score = 2, 3 or 4), pain had no more predictive effect on any of the three BPSD considered. In summary, pain entered alone in the regression equation was significantly associated with the three BPSD, but when cognition was taken into account and entered into the equation, pain dropped as a significant predictor of any of the three BPSD. However, the interaction of pain and cognition had a significant effect on the three BPSD, suggesting that cognition was a moderator of the relationship between pain and all three behaviours.

BPSD - independent variables relationships

The following independent variables were significant predictors of wandering: constipation (Beta = -0.33; p = 0.000), depression (Beta = 0.153; p = 0.000), incontinence (Beta = 0.131; p = 0.000), number of diseases (Beta = -0.41; p = 0.000), and mobility (Beta = -0.130; p = 0.000), and, as already reported, the cognitive performance level (Beta = 0.209; p = 0.000). After adjusting for these variables, pain dropped as a predictor of wandering.
VAB was significantly associated with depression (Beta = 0.320; p = 0.000) and incontinence (Beta = 0.092; p = 0.000). When taking into account these two variables both pain and cognition did no longer predict VAB.
PAB was significantly associated with depression (Beta = 0.118; p = 0.000), incontinence (Beta = 0.099; p = 0.000), mobility (Beta = 0.043; p = 0.00), and cognition (Beta = 0.039; p = 0.000). Again, pain dropped as a predictor after adjustment for these variables.

Discussion

Our study reports a tremendously high prevalence of pain in patients living in nursing homes. Wandering, VAB and PAB were frequently observed BPSD in this sample. Pain was significantly associated with wandering, VAB and PAB, but it explained little of the variance observed. Depression and cognitive impairment were the major moderators of the relationship between the three BPSD and pain.

We found a prevalence of pain in nursing homes of nearly 50% which corresponds roughly to results found in the literature that vary, however, considerably between 40 and 85% (18, 19). Our results showed a prevalence of wandering in nursing home residents of 13.5%, while other studies found higher values reaching 17.4% (2), 38% (20) or even 63% (21). Discrepant definitions of wandering are likely to account for some difference between the studies. Similarly, the prevalence of VAB of 12.5% was lower than that found in other studies that reported VAB to occur in up to 37% of the residents (22). The PAB prevalence of 4.4% was difficult to confront to the literature due to the lack of studies specifically investigating PAB.

As expected, pain and all three BPSD studied, i.e. wandering, VAB, and PAB, were associated with each other in our patient sample. As hypothesized, pain was significantly related to wandering. However, pain was a poor predictor of wandering. In keeping with our results, Kiely et al. (6) also found pain and wandering to be related in that nursing homes residents who expressed pain had an increased risk of developing wandering. To our knowledge, no study has so far looked into the possible link between the degree of pain and wandering. However, clinical knowledge teaches that recognising and treating pain is likely to reduce wandering in at least

some patients as suggested by a study finding that agitation could be reduced in residents treated against pain using a systematic approach in comparison to a control group (23).

Pain was also found to be correlated with VAB and PAB in our study, the effect sizes being once more very small. Cipher et al. (18) found that higher pain levels were associated with higher behavioural intensity and frequency including VAB and PAB such as impulsive behaviours, agitation, unrealistic demands. Similarly, Oh et al. (3) showed that aggressive residents had more pain, but they did not distinguish physical and verbal aggressiveness. They compared aggressive to non-aggressive nursing home residents to find that aggressive residents had higher levels of pain, but they were also older, had more cognitive impairment and stayed longer in nursing homes. As opposed to this, Leonard et al. (12) did not find any significant correlation between pain and VAB or PAB, nor could they give any explanation for this result. In their study, VAB and PAB were associated with depression, delusions, hallucinations and constipation, these results being similar to ours as to depression and constipation with depression being a major moderator of the 'pain – BPSD' relationship that may have blurred the results in Leonard et al.'s study.

Cognitive impairment was a predictor of wandering as in all studies investigating this association in nursing home residents (6, 7). In our analyses, cognitive impairment deleted the predictive effect of pain on wandering. Thus, pain was a predictor of wandering only when cognition was normal, but not in those with altered cognition. Only one study interested in pain and cognition was found and it partly contradicted our findings (18). According to that study, pain had a greater influence on number and frequency of behavioural problems, including wandering, among residents with severe dementia than in those with mild dementia. Nevertheless, they found that pain had a stronger influence on the intensity of behavioural problems among the residents with mild dementia. The fact that our study did not distinguish frequency from intensity of wandering may explain these contradicting results.
As for wandering, cognitive impairment was associated with VAB in our as well as other studies (9). Similar to our results, Cohen-Mansfield et al. (24) demonstrated, in another of their studies, a relationship between VAB and cognitive impairment with VAB being related to normal cognition or to early stage dementia, but not to more profound cognitive impairment. As for wandering, cognition was a clearly better predictor of VAB than pain. Again, the stronger relationship between VAB and cognition, as opposed to pain, may be in part secondary to the fact that cognition and VAB, at least to some extent, are direct neurobehavioural manifestations of dementia, unlike pain. We found no study interested specifically in the moderating effect of cognition on the 'pain – VAB' relationship to be compared to our findings.

Cognition was a predictor of PAB and, again, the association between pain and PAB was strongest when cognition was normal. Residents suffering from dementia are likely to express PAB for many reasons beyond pain, such as hunger, feeling of insecurity and persecution, while a cognitively normal resident may express his

discomfort with words instead of BPSD. Furthermore, PAB may be secondary to dementia-related brain lesions as already suggested above for wandering and VAB. Cohen-Mansfield et al. also found that PAB was more frequent in dementia and that aggressive residents were more often than not male, married, and demented (9). In their study, cognitively normal residents expressed different BPSD as residents suffering from dementia in that the cognitively normal expressed more VAB than PAB while cognitively impaired residents manifested more PAB and wandering. In keeping with this, we found increasing cognitive impairment to be a stronger predictor of wandering and PAB than VAB, increasing aphasia in dementia could be one factor contributing to these findings.

Limitations.

Despite the large sample size, which was one of the strength of this study, a number of limitations should be mentioned. First, recognising wandering, VAB or PAB as pathological or disruptive can be difficult as it may depend on personal threshold levels and, thus, hamper the accurate detection of these behaviours. Although RAI-MDS has been developed for clinical use and applied by clinical rather than research staff which may have introduced some inaccuracy in the judgment of these behaviours we believe that this potential bias did not influence our main findings. Indeed, the consistency of the data had been regularly monitored as part of the RAI-MDS programme. As pain and cognition explain little of the variance of the three BPSD observed, other variables, which were not included in this study, are likely to also predict these behaviours.

Conclusion

Wandering behaviours, VAB and PAB seem to be predicted by many factors. Although pain predicts only a small part of variance of these behaviours, it still remains important to recognise and treat pain in order to reduce these behaviours at least a little both in intensity and frequency. Given the dearth of studies and their somewhat contradictory results, further studies ought to investigate the role, the type and localisation of pain might play on the expression of different BPSD or how residents suffering from dementia perceive pain. Further studies should also deepen our understanding of the relationship between BPSD and depression, our study having shown that depression was a strong predictor of wandering, VAB and PAB.

		No pain	2	3	4	5	p-value	Cramer's V
Number		8566	2353	2233	2599	432		
Wandering (%)	0	88.4	83.3	83.0	85.3	86.3	0.000	0.036
	1	2.0	3.2	2.9	2.7	3.0		
	2	2.3	3.7	3.3	2.6	2.6		
	3	2.2	3.8	3.9	3.0	2.1		
	4	5.1	6.0	7.0	6.5	6.0		
VAB (%)	0	88.7	88.6	86.1	86.6	87.6	0.042	0.020
	1	2.4	2.7	2.8	2.8	2.6		
	2	4.6	5.3	6.0	5.0	5.0		
	3	2.3	3.0	2.8	3.2	2.6		
	4	2.0	2.4	2.3	2.4	2.2		
PAB (%)	0	96.6	95.2	94.9	94.8	93.5	0.000	0.036
	1	0.6	0.7	0.9	1.5	1.4		
	2	1.6	2.3	3.0	2.4	2.8		
	3	0.7	0.9	0.7	0.7	1.9		
	4	0.6	0.8	0.6	0.6	0.5		
Age groups (%)	< 64 y	4.1	3.6	3.6	4.1	4.4	0.474	0.016
	65-79 y	23.9	23.7	22.3	22.1	23.7		
	80-90 y	48.3	47.6	49.5	48.0	47.6		
	> 90 y	23.7	25.2	24.6	25.8	24.4		
Gender (%)	female	67.0	65.7	66.1	65.1	66.9	0.159	0.020
Civil status (%)	married	26.6	28.9	29.2	32.2	27.7	0.000	0.054
Smokers (%)	yes	8.6	8.5	7.9	8.8	7.2	0.678	0.013
Constipation (%)	yes	13.8	17.8	18.0	18.4	20.4	0.000	0.061
Alcohol consumption (%)	yes	28.6	30.6	30.7	29.8	30.6	0.139	0.021
Sleep disorders (%)	yes	19.2	21.8	20.2	20.8	23.6	0.001	0.028
MDS cognitive	1	43.5	12.5	12.5	16.0	16.7	0.000	0.190

scale (%)	2	16.9	28.1	30.4	31.0	34.4		
	3	24.5	36.5	36.3	33.2	29.8		
	4	15.2	22.9	20.9	19.8	19.1		
Depression (mean ± SD) (1-14)		1.96± 2.64	1.65± 2.32	1.91± 2.44	1.83± 2.43	1.90± 2.41	0.000	F=10.74
Incontinence (%)	yes	44.3	58.3	59.4	62.1	62.3	0.000	0.160
Mobility (%)	excellent	47.6	14.4	13.8	12.0	12.1	0.000	0.194
	slightly imp	10.9	13.4	11.7	9.2	6.7		
	moderately	19.5	31.8	32.8	32.0	29.9		
	impaired	4.2	8.3	9.7	11.0	10.0		
	bedridden	17.8	32.1	32.0	36.8	41.3		
Number of drugs taken (%)	None	2.2	2.1	1.9	2.2	1.0	0.032	0.022
	1	3.3	2.4	3.3	3.0	3.1		
	2-5	35.7	33.1	33.2	32.6	33.4		
	6-10	45.5	48.8	47.0	47.6	46.5		
	> 10	13.3	13.6	14.7	14.6	16.0		
Number of diseases (%)	None	11.5	6.2	5.7	6.0	7.2	0.000	0.058
	1	8.7	8.4	8.9	8.0	9.0		
	2-5	63.8	66.9	66.2	66.7	63.2		
	> 5	16.0	18.5	19.1	19.3	20.6		

Table 1.

This table shows the subjects' characteristics related to the level of pain.

VAB = Verbally Abusive Behaviour; PAB = Physically Abusive Behaviour; MDS = Minimum Data Set; SD = Standard Deviation.

Table 2

The role of pain and cognitive impairment in wandering, VAB and PAB					
Type of BPSD	R2	Regression significance level	dependant variable	regression coefficient for standardized variables	Significance level
Wandering	.045	.000	cognitive impairment	.198	.000
			pain	.010	.208
			pain and cognitive impairment	-.051	.000
VAB	.011	.000	cognitive impairment	.095	.000
			pain	.014	.076
			pain and cognitive impairment	-.021	.013
PAB	.012	.000	cognitive impairment	.101	.000
			pain	.012	.125
			pain and cognitive impairment	-.015	.068

Table 2.
This table shows the role that pain and cognitive impairment, both separately and together, play in relation to the three BPSD observed in our study (wandering, VAB, PAB).
BPSD = Behavioural and psychological symptoms of dementia; VAB = Verbally Abusive Behaviour; PAB = Physically Abusive Behaviour.

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