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Acceptability of public health information and prevention measures by gay men, bisexual men and men who have sex with men during the French Mpox outbreak in 2022: the ANRS-MPX-SHS cross-sectional survey

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ABSTRACT

Objectives This study investigated the acceptability by gay men, bisexual men and other men who have sex with men (GBMSM) of French public health information and prevention measures implemented during the 2022 Mpox outbreak.

Methods ANRS-MPX-SHS "Mpox: perception of risks, health measures and vaccination" is a cross-sectional survey conducted in GBMSM between July and September 2022. Online questionnaires collected information about Mpox-related awareness, perceptions and prevention behaviours. Multiple correspondence analysis identified participant profiles according to their level of acceptability of the information and prevention measures implemented during the 2022 outbreak. The study outcome was a variable grouping participants into three profiles: 'strong endorsers', 'uninformed hesitant endorsers' and 'indifferent objectors'. Multinomial logistic regression was used to estimate factors associated with each profile.

Results Of the 5688 participants, 5320 (93.5%) had available data for the outcome. The latter were mostly cisgender men (98%), aged between 35 and 54 years (54.5%), with tertiary education (82%); 44% were living in the Greater Paris region. Strong endorsers, uninformed hesitant endorsers and indifferent objectors accounted for 77.8%, 14.4% and 7.8% of the sample, respectively. Participants with tertiary education, those who had sex exclusively with men, those taking pre-exposure prophylaxis (ie, HIV-negative participants), HIV-positive participants and individuals living in the Greater Paris region, were all less likely to be uninformed hesitant endorsers or indifferent objectors. Participants with no lifetime HIV/sexually transmitted infection (STI) screening and those with infrequent screening were, respectively, more likely to belong to these two profiles.

Conclusions Participants' acceptability of the information and prevention measures implemented during the 2022 Mpox outbreak in France depended on the perceived capability of public health authorities to effectively diversify information targets, representations and communication channels. In order to prevent the transmission of Mpox (and other STIs) in the general population in future outbreaks, information and

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Co-construction with concerned populations is crucial for public health interventions to be effective. In order to improve gay men, bisexual men and other men who have sex with men (GBMSM) acceptability of prevention measures during future Mpox (and other infectious disease) outbreaks, it is crucial to take into account their needs, perceptions and experiences during the 2022 Mpox outbreak.

WHAT THIS STUDY ADDS

⇒ Thanks to the large study sample, we were able to identify a small group of GBMSM with no lifetime HIV/sexually transmitted infection (STI) screening despite the large number of screening mechanisms in place for this population in France. This small group represents a public health challenge for Mpox, HIV and other STIs. No lifetime screening may reflect (1) poor knowledge about these diseases, (2) inequalities in access to healthcare services and (3) a mismatch between testing services and related GBMSM preferences for vaccination (time, location, etc). Moreover, these three factors may be reasons as to why some GBMSM were distant from the health system. In the context of future outbreaks of Mpox and other infectious diseases, communication and interventions should be co-constructed with GBMSM, especially those never or not regularly screened for HIV/STIs. Moreover, the specific needs and experiences of these people during the Mpox outbreak of 2022 in France should be considered when co-constructing these interventions.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study highlights the need for further participative research in social sciences and public health in order to prepare countries for future outbreaks of Mpox and other infectious diseases. Its findings could guide prevention policy for future outbreaks.

measures adopted must take into account the needs, perceptions and experiences of persons never or not regularly screened for HIV/STIs.

INTRODUCTION

The 2022 Mpox outbreak in France saw 4043 confirmed cases up to 4 October 2022 (Santé Publique France), representing approximately 16% of all cases reported in the WHO's European Region up to the same date (European Centre for Disease Prevention and Control). As in many other countries, the outbreak in France was concentrated among people living with HIV, as well as gay and bisexual men, and other men who have sex with men (GBMSM hereafter).[1 2] The few French Mpox studies to date attribute containment of the outbreak to changes in sexual behaviours and to large-scale vaccination. They also highlight that adherence to prevention measures was essential for containment.[3–5] However, little is known about how adherence to these measures was shaped by the target population's acceptability of them, specifically regarding access to information, perceptions of Mpox vaccination and vaccine uptake, three elements described elsewhere as essential for tackling the epidemic.[6–9] In other countries, barriers to GBMSM adherence to prevention measures during the Mpox epidemic included stigma, poor living conditions, low perceived severity of the illness, lack of vaccine availability and the social cost of testing positive.[6] In contrast, tailored messages (ie, specific content for target audiences using particular communication channels) were essential for improving acceptability of prevention measures and increasing target populations' willingness to get vaccinated.[6–8 10]

The declaration of Mpox as a Public Health Emergency of International Concern by the WHO on 14 August 2024 was a wake-up call for countries in terms of their preparedness for another outbreak. The present study aimed to investigate the characteristics and factors associated with GBMSM acceptability of French public health information and prevention measures implemented during the 2022 Mpox outbreak, with a view to guiding prevention policy for future outbreaks of the disease. This information is crucial to co-construct tailored public health measures and to promote the involvement of key groups and communities in this co-construction.

MATERIAL AND METHODS

Survey population

Conducted in metropolitan France from July to September 2022, the cross-sectional study ANRS-MPX-SHS "Mpox: perception of risks, health measures and vaccination" documented GBMSM risk perceptions of Mpox, and their experiences of official information and prevention measures during the 2022 outbreak. Information about the study and a brief online questionnaire was disseminated through Grindr and two ongoing French studies (ANRS-Prévenir[11] and ANRS-Vaccigay).[12] Data on sociodemographic characteristics, sexual behaviours, awareness of Mpox, perceptions of government information and prevention measures, as well as sexual prevention practices were collected for adult persons self-identifying as GBMSM who agreed to participate.

Outcome

The outcome of the present analysis was a variable grouping participants into three profiles: 'strong endorsers', 'uninformed hesitant endorsers' and 'indifferent objectors'. These were identified using multiple correspondence analysis (MCA), followed by ascendant hierarchical clustering analysis (HCA) of nine indicators grouped into three themes:

- Awareness: The Mpox virus is currently circulating in France and the rest of the world. It is transmitted mainly through contact with the skin or mucous membranes (mouth, genitals, anus) with pimples, scabs or droplets (from spit or sneezes); Did you know all this? How well do you feel informed about Mpox? Vaccination is recommended for GBMSM, persons with several sexual partners and contact cases, did you know this?
- Perceptions: On a scale of 0–10, how worried are you about catching Mpox? On a scale from 0 to 10, how worried are you that GBMSM will be stigmatised or discriminated because of Mpox? Do you think Mpox affects you more than the heterosexual population? Among your friends and family, is there a fragile person (baby, immunocompromised person)?
- Behaviours: Isolation is recommended in case of Mpox infection. On a scale from 0 to 10, do you intend to isolate yourself if you are already infected or if you get infected? If vaccination were offered to all gays/bi/MSM, would you be prepared to be vaccinated? As of today, are you already vaccinated against Mpox or would you be willing to get vaccinated?

The purpose of MCA and HCA in the present analysis was to identify the presence of different groups (ie, dimensions) of participants sharing similarities in terms of awareness, perceptions and behaviours (ie, attributes) with regards to Mpox.[13 14] By summarising the nine items using MCA and HCA, homogeneous clusters of participants in terms of the attributes were identified, which allowed assessing their degree of acceptability of public health information and prevention measures.

Covariates

Variables used in the present analysis included: *demographic and socioeconomic characteristics*. Age (continuous), region of residence (Greater Paris/Other), education level (<high school/high school/tertiary). *Sexual behaviours and substance use*. Gender of sexual partners (men only/men and women); use of psychoactive products in a sexual context in the previous 6 months (yes/no). *HIV-related aspects*. Frequency of HIV/sexually transmitted infection (STI) screening (at least once per quarter/between once a quarter and once a year/less than once a year/never), HIV status and pre-exposure prophylaxis (PrEP) use (HIV-negative without PrEP/HIV-negative with PrEP/HIV seropositive).

Statistical analysis

A pairwise χ^2 test and Student's t-test were used in the descriptive analysis to compare the three GBMSM profiles (see above). Multinomial logistic regression was implemented using the 'strong endorser' profile as a reference. Adjusted ORs (aORs) and 95% CIs are presented. Variables with a p value<0.2 in the univariate analysis were tested in the multivariate model. A backward selection procedure was used to construct the final multivariate model,

Table 1 Sample characteristics, comparison of profiles and multivariate multinomial logistic regression (n=5320)

		Profile comparison (pairwise)					Multivariate model*			
	Total n=5320	Strong endorsers n=4140 (77.8%)	Uninformed hesitant endorsers n=766 (14.4%)		Unconcerned objectors n=414 (7.8%)		Uninformed hesitant endorsers (vs strong endorsers) n=766		Unconcerned objectors (vs strong endorsers) n=414	
	N (%)	N (%)	N (%)	P value	N (%)	P value	aOR (IC 95%)	P value	aOR (IC 95%)	P value
Indicators used for the construction of the outcome										
Awareness										
Aware of Mpox symptoms and transmission routes?										
Yes	4959 (93.2)	4136 (100)	425 (55)	<0.001	398 (97.1)	<0.001				
No	361 (6.8)	4 (<0.1)	341 (45)	<0.001	16 (3.9)	<0.001				
How well do you feel informed about Mpox?										
Very well	927 (17.4)	771 (19.)	9 (1.2)	<0.001	147 (36)	<0.001				
Quite well	2710 (51)	2436 (59)	95 (12.3)	<0.001	179 (43)	<0.001				
Not very well	1501 (28.2)	929 (22)	500 (65.3)	<0.001	72 (17)	0.064				
Not at all	182 (3.4)	4 (<0.1)	162 (21.2)	<0.001	16 (4)	<0.001				
Aware of vaccination criteria?										
Yes	4486 (84)	3872 (94)	266 (35)	<0.001	348 (84)	<0.001				
No	834 (16)	268 (6)	500 (65)	<0.001	66 (16)	<0.001				
Perceptions										
On a scale of 0–10, worry about catching Mpox (median (IQR))	7 (5–8)	8 (6–8)	6 (4–8)	<0.001	1 (0–4)	<0.001				
On a scale from 0 to 10, worry about GBMSM stigma because of Mpox (median (IQR))	9 (7–10)	9 (7–10)	9 (7–10)	0.008	7 (1–10)	<0.001				
Do you think Mpox affects you more than the heterosexual population?										
I do not feel affected by it at all	651 (12)	270 (6.5)	198 (26)	<0.001	183 (44.5)	<0.001				
I feel it affects me a little bit more than heterosexuals	1837 (35)	1378 (33.3)	370 (48)	<0.001	89 (21.3)	<0.001				
I feel it affects me much more than heterosexuals	2832 (53)	2492 (60.2)	198 (26)	<0.001	142 (34.2)	<0.001				
Among your friends and family, is there a fragile person (baby, immunocompromised person)?										
Yes	1425 (27)	1062 (26)	284 (37)	<0.001	79 (19)	0.012				
No	3895 (73)	3078 (74)	482 (63)	<0.001	335 (81)	0.012				
Behaviours										
On a scale from 0 to 10, isolation intentions (median (IQR))	9 (7–10)	9 (8–10)	9 (6–10)	<0.001	8 (1–10)	<0.001				
If vaccination were offered, would you be prepared to be vaccinated?										
I absolutely would get vaccinated	2844 (53.5)	2280 (55)	430 (56.2)	>0.9	134 (32.4)	<0.001				
I am not sure I would get vaccinated	111 (2.1)	38 (1)	60 (7.8)	<0.001	13 (3.1)	<0.001				
I absolutely would not get vaccinated	427 (8)	108 (2.6)	162 (21.2)	<0.001	157 (37.9)	<0.001				
Missing values	1938 (36.4)	1714 (41.4)	114 (14.8)		110 (26.6)					

Continued

Table 1 Continued

		Profile comparison (pairwise)					Multivariate model*			
	Total n=5320	Strong endorsers n=4140 (77.8%)	Uninformed hesitant endorsers n=766 (14.4%)		Unconcerned objectors n=414 (7.8%)		Uninformed hesitant endorsers (vs strong endorsers) n=766		Unconcerned objectors (vs strong endorsers) n=414	
	N (%)	N (%)	N (%)	P value	N (%)	P value	aOR (IC 95%)	P value	aOR (IC 95%)	P value
Currently or willing to receive mpox vaccination?										
Yes	4719 (89)	3976 (96)	516 (67)	<0.001	227 (55)	<0.001				
No	601 (11)	164 (4)	250 (33)	<0.001	187 (45)	<0.001				
Covariates considered for the analysis										
Demographic and socioeconomic characteristics										
Age (median (IQR))	41 (32–50)	41 (33–50)	41 (32–49)	0.18	41 (32–50)	1.00				
Gender										
Cisgender man	4557 (97.5)	3484 (98)	703 (98)	<0.001	370 (97)	0.019				
Other	116 (2.5)	86 (2)	17 (2)	>0.9	13 (3)	0.648				
Missing values	647	570	46		31					
Region										
Greater Paris	2282 (43.9)	1888 (47)	240 (32)	<0.001	154 (38)	0.002	0.67 (0.55 to 0.81)	<0.001	0.74 (0.58 to 0.94)	0.014
Other	56.1 (12)	2159 (53)	508 (68)	<0.001	253 (62)	0.004	ref		ref	
Missing values	118	93	18		7					
Education level										
Less than high school	393 (7.6)	268 (6.5)	82 (11)	<0.001	43 (11)	0.011	ref		ref	
High school	549 (10.6)	386 (9.5)	110 (15)	<0.001	53 (13)	0.084	0.97 (0.69 to 1.36)	0.9	0.89 (0.57 to 1.39)	0.6
Tertiary	4233 (81.8)	3388 (84)	536 (74)	<0.001	309 (76)	0.001	0.57 (0.43 to 0.75)	<0.001	0.61 (0.43 to 0.87)	0.006
Missing values	145	98	38		9					
Sexual behaviours and substance use										
Sexual partners' gender in the past 6 months										
Men only	4195 (79.2)	3284 (80)	597 (78)	>0.9	314 (77)	0.333	ref		ref	
Men and women	1101 (20.8)	841 (20)	167 (22)	0.097	93 (23)	0.113	1.71 (1.31 to 2.23)	<0.001	1.57 (1.10 to 2.23)	0.013
Missing values	24	15	2		7					
Use of psychoactive products during sex in the past 6 months?										
Yes	701 (15)	574 (16)	83 (12)	0.083	44 (12)	0.236				
No	3876 (85)	2952 (84)	605 (88)	<0.001	319 (88)	0.046				
Missing values	743	614	78		51					
HIV-related aspects										
Frequency of HIV or STI screening?										
At least once a quarter	1711 (32)	1435 (35)	151 (20.5)	<0.001	125 (30)	0.229	ref		ref	
Between once a quarter and once a year	1490 (28)	1181 (29)	218 (28)	>0.9	91 (22)	0.017	1.27 (0.98 to 1.64)	0.073	0.73 (0.53 to 1.01)	0.056
Less than once a year	743 (14)	526 (13)	157 (20)	<0.001	60 (14)	>0.9	1.79 (1.33 to 2.40)	<0.001	0.86 (0.58 to 1.27)	0.4
Never	161 (3)	91 (1)	42 (5.5)	<0.001	28 (7)	<0.001	2.30 (1.38 to 3.83)	0.001	2.30 (1.25 to 4.26)	0.008
Missing values	1215 (23)	907 (22)	198 (26)		110 (27)		1.43 (0.65 to 3.11)	0.4	1.37 (0.55 to 3.44)	0.5
HIV PrEP										
HIV-negative without PrEP	2253 (42.3)	1628 (39.5)	429 (56)	<0.001	196 (47)	0.005	ref		ref	

Continued

Table 1 Continued

	Total n=5320	Profile comparison (pairwise)					Multivariate model*			
		Strong endorsers n=4140 (77.8%)	Uninformed hesitant endorsers n=766 (14.4%)		Unconcerned objectors n=414 (7.8%)		Uninformed hesitant endorsers (vs strong endorsers) n=766		Unconcerned objectors (vs strong endorsers) n=414	
	N (%)	N (%)	N (%)	P value	N (%)	P value	aOR (IC 95%)	P value	aOR (IC 95%)	P value
HIV-negative with PrEP	1535 (28.9)	1302 (31)	130 (17)	<0.001	103 (25)	0.021	0.51 (0.39 to 0.66)	<0.001	0.63 (0.46 to 0.85)	0.003
HIV seropositive	542 (10.2)	447 (11)	65 (8)	0.190	30 (7)	0.091	0.61 (0.45 to 0.82)	0.001	0.54 (0.36 to 0.82)	0.004
Missing values	990 (18.6)	763 (18.5)	142 (19)		85 (21)		1.07 (0.72 to 1.59)	0.7	0.90 (0.53 to 1.54)	>0.7
Survey channel										
Data collected through										
ANRS-Vaccigay study	428 (8)	260 (7)	113 (15)	<0.001	55 (13)	<0.001	2.23 (1.02 to 4.87)	0.045	1.46 (0.57 to 3.71)	0.4
Grindr	4174 (78.5)	3284 (79)	580 (76)	0.085	310 (75)	0.121	ref		ref	
ANRS-Prevenir cohort study	718 (13.5)	596 (14)	73 (9)	0.001	49 (12)	0.530	0.37 (0.16 to 0.87)	0.023	0.44 (0.16 to 1.25)	0.13

*The multivariate model was adjusted to take into account fixed effects arising from each survey channel (ie, Grindr, ANRS-Prévenir cohort, ANRS-Vaccigay study). Variables with a p value<0.2 in the univariate analysis were tested in the multivariate model. A backward selection procedure was used to construct the final multivariate model, retaining factors with p value<0.05.
ANRS, ANRS Maladies infectieuses Emergentes; aOR, adjusted OR; GBMSM, gay men, bisexual men and other men who have sex with men; PrEP, pre-exposure prophylaxis; STI, sexually transmitted infection.

retaining factors with p value<0.05. Analyses were performed using R software (V.4.4.0).

RESULTS

Of the 5688 respondents, 5320 (93.5%) had available data for all the nine items (awareness, perceptions and behaviours) used to construct the outcome and were retained for the analysis (ie, 6.5% excluded because missing information for at least one item). Among the 5320 participants in the analysis, 78.5% were recruited through the Grindr app, 13.5% and 8% from the ANRS-Prevenir cohort and ANRS-Vaccigay studies, respectively. In addition, 44% lived in the Greater Paris region, 98% declared being cisgender men, 54.5% were aged 35–54 years and 82% had tertiary education (table 1).

Almost all participants (93.2%) were aware of Mpox and its transmission mechanisms. However, 31.6% declared having little or no related information; only 17.4% declared they were very well informed; 84% knew vaccination was recommended for GBMSM, persons with multiple sexual partners and contact cases. There was a strong perception of Mpox-related stigmatisation/discrimination (median (IQR): 9 (7–10)). Participants seemed to be worried about being infected (median (IQR): 7 (5–8)), 52% felt that Mpox affected them much more than heterosexual people and 27% had a loved one with a fragile condition. The median intention to self-isolate score was high (median (IQR): 9 (7–10)). Finally, 89% of participants were already vaccinated or were willing to be vaccinated.

Concerning the outcome, 77.8% of participants were grouped into the 'strong endorsers' profile. These persons were very well/fairly well informed, very concerned about Mpox infection and were already vaccinated or willing to be. One in seven (14.4%) participants were grouped into the 'uniformed hesitant endorsers' profile. They had little or no information and were vaccine hesitant. Finally, 7.8% of the sample were grouped into the 'indifferent objectors' profile (7.8%). These persons were unconcerned about Mpox and disagreed with vaccination (table 1).

Multivariate analysis (table 1) highlighted that compared with strong endorsers (ie, reference profile):

(1) *Uninformed hesitant endorsers* were less likely to live in the Greater Paris region (aOR: 0.67, 95% CI (0.55 to 0.81)) and to have tertiary education (aOR: 0.57, 95% CI (0.43 to 0.75)). Moreover, participants who declared sexual relations with both men and women (aOR: 1.71, 95% CI (1.31 to 2.23)), and those screening less than once a year (aOR: 1.79, 95% CI (1.33 to 2.40)) or who had no lifetime screening (aOR: 2.30, 95% CI (1.38 to 3.83)) for HIV/STIs were more likely to be in this profile. Finally, HIV-negative participants taking PrEP (aOR: 0.51, 95% CI (0.39 to 0.66)) and HIV-positive participants (aOR: 0.61, 95% CI (0.45 to 0.82)) were less likely to be in this profile.

(2) *Indifferent objectors* were less likely to live in the Greater Paris region (aOR: 0.74, 95% CI (0.58 to 0.94)) and to have tertiary education (aOR: 0.61, 95% CI (0.43 to 0.87)). Participants who declared sexual encounters with men and women (aOR: 1.57, 95% CI (1.10 to 2.23)) and those with no lifetime HIV/STI screening (aOR: 2.30, 95% CI (1.25 to 4.26)) were more likely to be in this profile. In contrast, HIV-negative participants (taking PrEP (aOR: 0.63, 95% CI (0.46 to 0.85)) or not (aOR: 0.54, 95% CI (0.36 to 0.82)) were less likely to be in this profile.

DISCUSSION

Our study confirmed previous findings that GBMSM have different profiles in terms of health issues that disproportionately affect them. It is encouraging to observe that a significant proportion of participants in ANRS-MPX-SHS were aware of Mpox and its transmission mechanisms, were not indifferent about the epidemic and were

either already vaccinated or were willing to be vaccinated against it. These results may reflect the strong community mobilisation by HIV and LGBT (lesbiennes, gays, bisexuels et trans) community-based organisations and various health authorities starting in June 2022. Furthermore, the high level of awareness of the risks associated with Mpox and related harm reduction options observed in our study advocates the continuation of targeted sexual health campaigns for GBMSM, especially during infectious disease epidemics.

However, we also found two relatively small GBMSM profiles/groups that are most probably distant from sexual health services (ie, 'indifferent objectors' and 'uninformed hesitant endorsers'). These findings are consistent with public health observations suggesting the existence of small groups with specific needs concerning PrEP or HPV vaccination.[12] The two small groups identified in our analysis pose a major challenge for public health. Accordingly, specific strategies are needed to reach them, in preparation for future Mpox outbreaks.

Diversifying target populations in community awareness campaigns and accounting for the diversity of GBMSM profiles is essential to improve the acceptability of official health prevention measures, especially in the context of emerging infectious diseases. For example, existing sexual health campaigns in France rarely target bisexuals or those distant from community resources (whether by choice or because of geographical and social barriers). Moreover, the diversity of representations arising from these different profiles must be taken into account in terms of ethnocultural, generational and gender dimensions. Diversifying communication channels is another crucial element for community awareness campaigns. More specifically, campaigns need to promote vaccination and harm reduction strategies on social networks and apps, all the while remembering that different generations use these tools to different degrees.

Our results shed light on the challenges in targeting prevention messages at marginalised populations in a context where there is a significant anticipated or real risk of stigmatisation. In the context of the 2020 Mpox outbreak in France, which was a relatively concentrated epidemic, the GBMSM community denounced the way information about related transmission risks and vaccination was disseminated. The community felt that targeted information for GBMSM was almost inexistent, and that when it was provided, it could lead to stigmatisation. For the relatively small groups of GBMSM furthest from community information networks, ensuring that tailored information is disseminated as widely as possible in society could be one action to increase their awareness of health issues concerning themselves and their partners.

The main study limitation was the very short questionnaire in ANRS-MPX-SHS, which did not cover several sociodemographic characteristics (eg, country of birth, marital status, living conditions). Furthermore, data on whether participants had already been infected with Mpox was not collected. The main study strength was the identification of the 'indifferent objector' GBMSM group. The absence of lifetime HIV/STI screening in this profile in the French context highlights the need for tailored strategies to reach them.

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Contributors LS-T, MDS, PR, BS, J-MM and GG designed the study. MH led the analysis under the supervision of LS-T and GG. LA performed the data management. MM, MB, GM, AV, PP-W, DM and PV provided ongoing support to study design and data collection. LS-T drafted the first version of the manuscript. Subsequent drafts were written collaboratively with input from LS-T, MDS, CP, PV, DM, MSa, AV, MC, PP-W, P-B-VT, VLu, VLe, MSi, GP, J-MM, PR, BS, GG. All authors have critically read and approved the final manuscript.

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