



AOA Critical Issues in Education

Orthopaedic Surgery Residency Program Social Media Presence During the COVID-19 Pandemic

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Background: In light of away rotation and in-person interview cancellations for the 2020 to 2021 application cycle, social media has become a popular tool for orthopaedic surgery residency programs to highlight their strengths, curricula, and social life to prospective applicants. The authors sought to explore the proliferation and utilization of 3 popular social media platforms by both orthopaedic surgery departments and residencies.

Methods: Orthopaedic surgery departmental and residency program social media accounts and their creation dates across Facebook, Twitter, and Instagram were identified using a standardized search methodology. Residency Instagram accounts were further evaluated for the number of posts, followers, likes, and comments. Both departments and residency programs were cohorted by affiliation with a *US News & World Report* (USNWR) top 50 American hospital for orthopaedics or by status as a Doximity top 20 program based on reputation.

Results: Across a total of 192 residency programs included for analysis, Instagram was the most popular social media platform (61.5%), followed by Twitter (19.8%) and Facebook (10.4%). Conversely, orthopaedic departments more frequently used Facebook (33.9%) and Twitter (28.1%) over Instagram (17.2%). Of the 118 residency Instagram accounts, 102 (86.4%) were created after the onset of the COVID-19 pandemic. Larger residency programs (≥ 6 spots/year) and those programs in the Doximity top 20 or affiliated with USNWR top 50 orthopaedic hospitals had a greater number of followers as well as likes and comments per post ($p < 0.05$ for all).

Conclusions: Given the recruitment challenges faced by residency programs because of the COVID-19 pandemic, Instagram has rapidly become a prominent platform for attracting orthopaedic surgery applicants. These accounts have a large number of followers, particularly for residency programs with higher Doximity reputation rankings.

Social media has become a near ubiquitous component of daily life, with nearly three-fourths of Americans using at least 1 social media platform, rising to $>90\%$ of individuals aged 18 to 29 years¹. Among younger individuals, Twitter and Instagram are popular platforms given their optimization

for mobile consumption and the ability to interact through photos/videos. For orthopaedic surgery departments and practices, social media has become a valuable method of advertising services and recruiting patients². Social media presence is associated with easier accessibility through Google searches and higher

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provider ratings^{3,4}. In 2014, approximately 50% of orthopaedic patients used social media, with younger patients up to 50× more likely to have accounts⁵.

Although social media use is important for patient recruitment, it has also become a popular tool for residency applicants to access information about prospective training programs. During the COVID-19 pandemic, the cancellation of in-person away rotations and interviews forced applicants to identify ways of obtaining program details⁶. Aside from residency websites, which historically are variable in content⁷, a newer avenue for obtaining information is through program-run social media accounts. These accounts are informal platforms for advertising various components of programs, including information on curriculum, social life, and research.

A significant rise in social media accounts over the past year has been observed in several medical specialties^{8,9}, but these trends have not yet been reported in orthopaedics. Two common types of social media accounts were identified as follows: (1) “residency accounts,” which highlight residency programs and are managed by residents/graduate medical education, and (2) “departmental accounts,” which highlight departmental services/activities and news. The purpose of this study was to report on the prevalence of these accounts and the timing of account creation relative to the COVID-19 pandemic. We hypothesized that most of the residency accounts were created after the start of the pandemic in an effort to interface with applicants. Furthermore, we hypothesized that programs and departments with higher rankings would have greater numbers of social media accounts and Instagram followers.

Materials and Methods

A list of all US Accreditation Council for Graduate Medical Education (ACGME)–accredited orthopaedic surgery residency programs was obtained¹⁰ and cross-referenced with a list of programs accepting applications through the Electronic Residency Application Service (ERAS) for the 2020 to 2021 cycle¹¹. Military residencies (N = 8) and other programs (N = 1) that do accept applications through ERAS were excluded. The number of residency positions per class was determined through institutional website review, and the 2020 to 2021 Doximity Residency Navigator reputation rankings for programs were recorded¹². These are subjective evaluations of programs based on peer reviews from board-certified orthopaedic surgeons and nominations from alumni/current residents¹². The 2020 to 2021 *US News & World Report's* (USNWR) “Best Hospitals for Orthopedics” rankings—ranking orthopaedic surgery departments—were similarly collected and their affiliation to residency programs determined (e.g., the Mayo Clinic Department Orthopedic Surgery Department is affiliated with the Mayo Clinic Orthopedic Surgery Residency Program)¹³. These rankings are more data-driven and are based on a combination of patient outcomes (37.5%), patient experience (5%), expert opinion (27.5%), and other care-related indicators (30%).

The presence and activity of residency programs or orthopaedic surgery departments and affiliated institutes (i.e., private groups affiliated with academic medical centers such

as OrthoCarolina) on 3 commonly used social media platforms—Instagram, Facebook, and Twitter—served as the basis for this study. Social media accounts were identified (author J.T.B.) through (1) searching program/department websites for accounts and (2) searches using the full and/or abbreviated names of each program/hospital followed by the words “orthopedic surgery,” “orthopedics,” “orthopaedics,” “ortho,” and “residency.” All accounts since the platform creation were searched: Facebook (2004-present), Twitter (2006-present), and Instagram (2010-present). Accounts focusing on orthopaedic surgery residency programs and managed by the residents/graduate medical education office (identified through account biographies or noted in posts) were classified as “residency accounts” while accounts focusing on orthopaedic departmental services/activities and news were classified as “department accounts.” Accounts with significant overlap in content between the residency program and department were listed under both categories to minimize the bias of arbitrarily selecting 1 category. This overlap was defined by >25% of posts dedicated to departmental activities/services and residency highlights. In addition to the presence of a corresponding social media account, the date of page creation (Facebook page) or first post (Facebook account, Twitter, and Instagram) was also recorded.

For residency Instagram accounts, the number of followers, accounts followed, and total number of posts, likes, and comments were tallied. Posts were categorized (authors L.J. and W.H.) as being clinical, research, program information, people spotlight, residency, social, or current events. “Clinical” posts depicted clinical vignettes, educational topics, and operations while “research” posts detailed publications or conference attendance/presentations. Posts detailing the residency, city/location, and informational sessions were categorized as “program information.” Posts highlighting specific individuals (e.g., faculty, visiting professors, and residents/alumni) were classified as “people spotlight.” “Day-in-the-life” posts emphasizing various aspects of resident experiences were placed in the “residency” category while posts focused on life outside of the hospital were considered “social.” Finally, images that discussed the COVID-19 pandemic or social/political issues were categorized as “current events.” Posts featuring >50% women or containing the hashtags “#womeninortho” or “#looklikea-surgeon” were also separately tallied, as were programs using the Instagram “highlights” feature.

All data collection occurred between March 8 and 10, 2021, after the submission of residency program rank lists (March 3, 2021). In addition to reporting basic statistics, residencies and departments were cohorted as (1) being ranked or unranked in the USNWR top 50 and (2) being inside or outside of the top 20 Doximity reputation rankings. Statistical analysis was conducted using IBM SPSS Statistics for Macintosh (version 24.0) using a threshold of $p < 0.05$ for significance. Categorical variables were analyzed using chi-squared and Fisher exact tests, whereas continuous variables were analyzed using Mann-Whitney U tests. There was no funding for this study. All data were publicly available and did not require institutional review board approval.

TABLE I Residency Program Instagram Posts by Program Size*			
	≥6 Spots/Year	<6 Spots/Year	p
N	41	77	—
Followers	1,095.0 (981.5-1,286.0)	781.0 (562.0-1,005.5)	<0.001
Following	234.0 (133.5-375.5)	171.0 (96.5-267.0)	0.024
Posts	38.0 (19.5-69.5)	29.0 (13.0-46.0)	0.117
Likes per post	71.6 (57.3-86.7)	45.6 (24.3-65.6)	<0.001
Comments per post	1.6 (1.0-2.1)	1.0 (0.6-1.7)	0.009
Use “highlights”	27 (65.9)	32 (41.6)	0.012

*Statistics reported as median (interquartile range) and number (%).

Results

From a total of 201 US ACGME-accredited orthopaedic surgery residency programs, 192 met inclusion criteria. Three programs were new for the 2020 to 2021 cycle, and 5 held special ACGME osteopathic recognition. Twenty residency programs (10.4%) had Facebook accounts/pages, 38 (19.8%) had Twitter accounts, and 118 (61.5%) had Instagram accounts. In comparison, orthopaedic departments/affiliated institutes were significantly ($p < 0.001$) more likely to have a Facebook ($N = 65$, 33.9%) or Twitter ($N = 54$, 28.1%) account but had fewer Instagram accounts ($N = 33$, 17.2%). Eight, 7, and 5 programs had combined department/residency Facebook, Twitter, and Instagram accounts, respectively. A total of 125 programs (65.1%) and 83 departments (43.2%) had a social media presence on ≥ 1 platform. The most common combination of platforms for both

programs ($N = 26$) and departments ($N = 24$) was Twitter and Instagram. Twenty-four departments had accounts across all 3 platforms vs. 6 residency programs.

Programs with ≥ 6 residents/year were more likely to have an Instagram account (83.7% vs. 53.8%, $p < 0.001$) although there was no difference based on program size regarding Facebook ($p = 0.304$) or Twitter ($p = 0.170$) presence. Larger programs also had a higher number of Instagram followers, likes per post, comments per post, and followed more accounts (all $p < 0.05$, Table I). In addition, 102 residency Instagram accounts (86.4%) were created after the COVID-19 pandemic (March 11, 2020, based on the World Health Organization Declaration¹⁴), in contrast to only 10 residency Facebook pages (50.0%) and 29 Twitter accounts (76.3%) (Figs. 1 and 2). The first Facebook, Twitter, and Instagram accounts (either department or residency

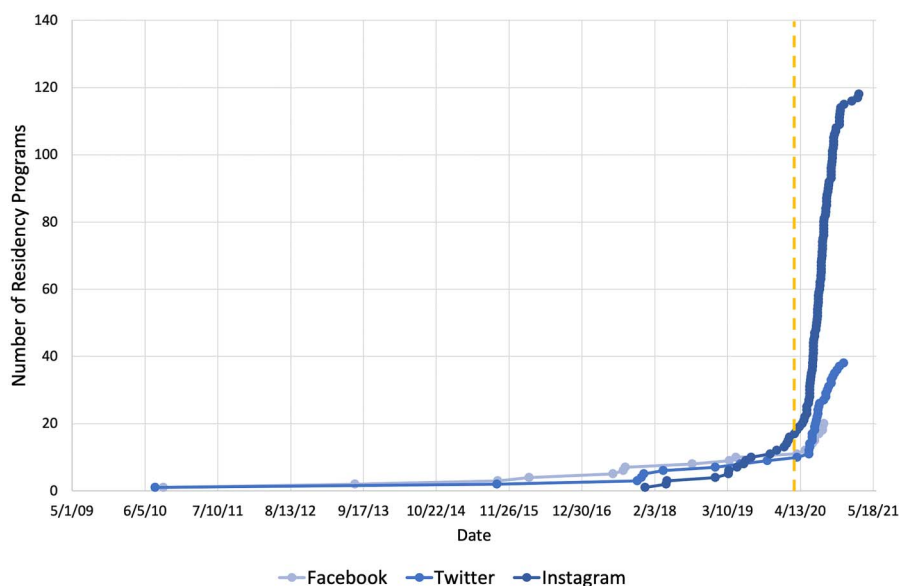


Fig. 1 Orthopaedic surgery residency program social media account creation. The vertical yellow bar represents the date of the World Health Organization COVID-19 pandemic declaration (March 11, 2020). The first residency program Facebook, Twitter, and Instagram accounts were created on September 14, 2010, August 1, 2020, and December 13, 2017, respectively.

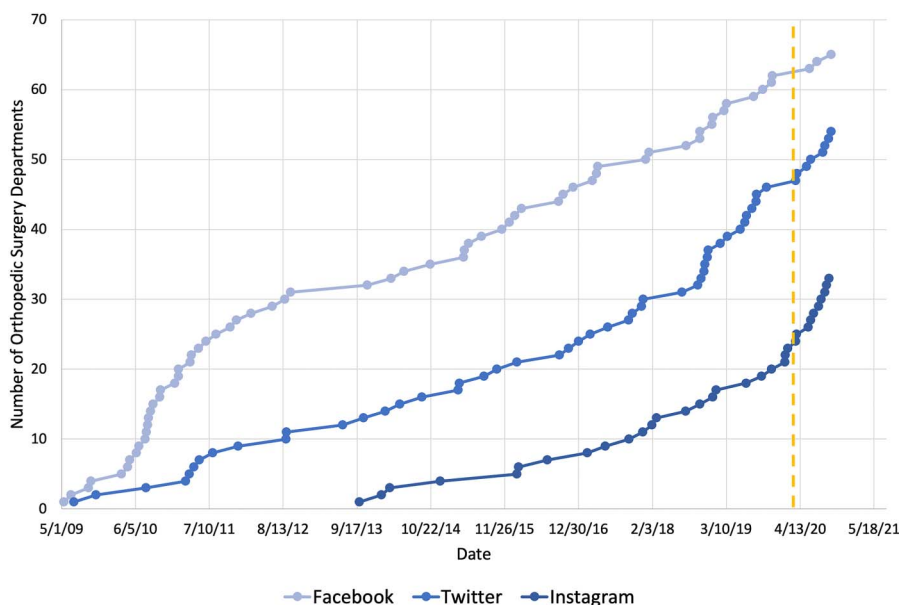


Fig. 2 Orthopaedic surgery department and affiliated institution social media account creation. The vertical yellow bar represents the date of the World Health Organization COVID-19 pandemic declaration (March 11, 2020). The first residency program Facebook, Twitter, and Instagram accounts were created on May 15, 2009, July 7, 2009, and September 30, 2013, respectively.

program) were created on May 15, 2009, July 7, 2009, and September 30, 2013, respectively.

Thirty-nine residency programs were affiliated with hospital orthopaedic departments ranked in the USNWR top 50 for orthopaedics. Of the remaining 11 hospitals in the top 50 hospitals, 6 were affiliated with programs that also trained at a higher-ranking hospital (i.e., multiple affiliations) and 5 were unaffiliated with a residency program. There was no difference in the proportion of Facebook (10.3% vs. 10.5%, $p = 1.000$), Twitter (23.1% vs. 19.0%, $p = 0.564$), or Instagram (71.8% vs. 58.8%, $p = 0.137$) accounts for residency programs affiliated with a top USNWR orthopaedics department. However, orthopaedic departments ranked by the USNWR were more likely to have Facebook (53.8% vs. 28.8%, $p = 0.003$), Twitter (56.4% vs. 20.9%, $p < 0.001$), and Instagram (38.5% vs. 11.8%, $p < 0.001$) accounts. When com-

paring residency programs ranked inside or outside of the Doximity top 20, there were no differences in the proportion with Facebook (15.0% vs. 9.9%, $p = 0.444$), Twitter (30.0% vs. 18.6%, $p = 0.226$), or Instagram (80.0% vs. 60.0%, $p = 0.081$) accounts. Conversely, orthopaedic departments affiliated with residency programs ranked in the Doximity top 20 were significantly more likely to have Facebook (65.0% vs. 30.2%, $p = 0.002$), Twitter (65.0% vs. 23.8%, $p < 0.001$), and Instagram (45.0% vs. 14.0%, $p < 0.001$) accounts.

When analyzing residency program Instagram accounts, the median number of followers (i.e., other accounts that follow the index account) and accounts followed (i.e., accounts that the index account follows) were 992.5 (interquartile range [IQR] 630.3-1,110.0) and 186.5 (IQR 107.5-283.5), respectively. Each program posted a median 31.5 (IQR 14.0-60.3) times, receiving a median 55.7 (IQR 31.6-74.7) likes and 1.2

TABLE II Residency Program Instagram Posts by US News & World Report's Ranking*			
	Top 50	Unranked	p
N	28	90	—
Followers	1,128.0 (865.8-1,415.5)	861.5 (576.6-1,044.8)	<0.001
Following	220.5 (181.0-303.0)	172.0 (91.0-281.5)	0.073
Posts	39.5 (20.3-60.5)	31.0 (14.0-60.3)	0.467
Likes per post	71.9 (55.4-92.0)	53.1 (26.1-68.5)	<0.001
Comments per post	1.8 (1.0-2.3)	1.0 (0.6-1.7)	0.003
Use "highlights"	19 (67.9)	40 (44.4)	0.030

*Statistics reported as median (interquartile range) and number (%).

TABLE III Residency Program Instagram Posts by Doximity Ranking*			
	Top 20	Outside Top 20	p
N	16	102	—
Followers	1,287.0 (1,129.5-1,578.3)	846.5 (583.5-1,047.3)	<0.001
Following	287.5 (186.3-377.8)	176.5 (98.3-279.5)	0.010
Posts	57.5 (30.5-85.0)	29.0 (13.3-48.5)	0.003
Likes per post	84.5 (74.6-96.0)	53.5 (28.7-68.5)	<0.001
Comments per post	1.8 (1.1-2.4)	1.1 (0.6-1.9)	0.007
Use “highlights”	13 (81.3)	46 (45.1)	0.013

*Statistics reported as median (interquartile range) and number (%).

(IQR 0.7-1.9) comments per post. The median likes averaged over the last 3 posts increased to 210.5 (IQR 144.8-302.8). Fifty-nine programs (50.0%) used the “highlights” feature. When comparing programs based on affiliation with top USNWR orthopaedic departments, higher-ranked programs had more followers, likes, and comments per post (all $p < 0.05$, Table II). Similarly, programs ranked in the Doximity top 20 had more followers, total posts, likes, and comments per post, and followed more accounts (all $p < 0.05$, Table III). The most common posting topics were people spotlight (30.3%), residency (23.1%), and social (18.9%, Fig. 3). Across a total of 4,742 posts, 613 (12.9%) focused on women in orthopaedics.

Discussion

Social media has become a popular platform for surgeons to publicize services available to patients¹⁵. Residency programs, facing the unique constraints of recruitment during the COVID-19 pandemic, have similarly adopted social media as a way of interacting with prospective trainees. We found that the most popular platform for residencies was Instagram, whereas departments were more likely to use Facebook/Twitter. These findings are in line with data from the Pew Research Center, where 79% of individuals aged 18 to 29 years (representing many residency applicants) use Instagram vs. just 23% of people aged 50 to 64 years¹. The emphasis on photo-sharing and video-sharing by Instagram may explain its higher use among residencies, which may be seen as less formal and could facilitate more dialogue about various program characteristics.

For orthopaedic departments and institutions, the benefits of increased social media presence are numerous. Triemstra et al. reported that USNWR hospital reputation scores correlate with Twitter/Facebook follower count and total tweets, whereas total points in the USNWR rankings correlate with social media presence on each of Facebook, Twitter, and Instagram¹⁶. In urology, increased departmental Twitter activity has been associated with higher USNWR reputation scores¹⁷, and more Twitter followers were shown to be an independent predictor of gastrointestinal division rankings¹⁸. Such findings have led to calls for increased adoption of social media by orthopaedic surgeons as a tool for publicizing services while improving reputation^{2,19}.

Our results mirror these findings because departments ranked by the USNWR or affiliated with Doximity top 20 residencies more frequently used all 3 social media platforms. That being said, the implication that higher social media activity leads to or is correlated with hospital reputation should be cause for pause because it is not necessarily true that more prestigious institutions with a social media presence provide higher quality of care. However, the financial implications of social media adoption are hard to ignore because this has likely, by way of higher reputation, led to higher patient volume.

Although orthopaedic surgeons/departments have progressively adopted social media over the past 10 years, residency program accounts have only dramatically increased during the COVID-19 pandemic. Although 97% of residencies had program websites in 2015, the quality/content on these sites varied dramatically, with <50% reporting call schedules⁷. Such variation in online presence may itself have warranted the creation of social media accounts that allow applicants to interact with residents²⁰. This coupled with the cancellation of in-person away rotations and interviews during the pandemic likely accelerated the creation of resident-driven social media accounts as a means of attracting applicants. Interestingly, our findings demonstrate that

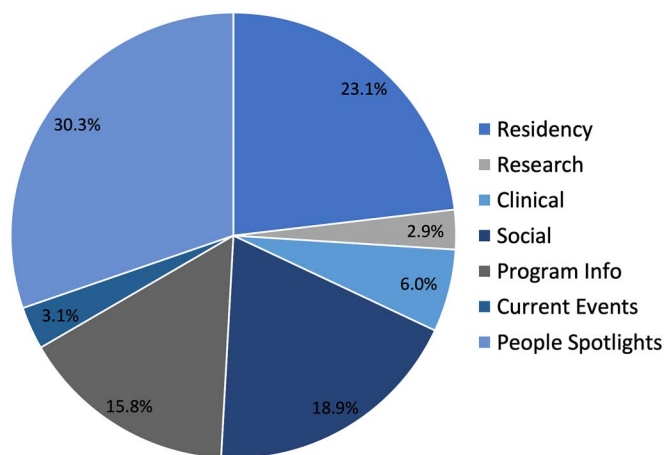


Fig. 3
Categorization of Orthopaedic Surgery Residency Program Instagram Posts.

orthopaedic departments were earlier adopters of social media, perhaps as a means for attracting patients and promoting services (demonstrated in Figs. 1 and 2). Ahmadmehrabi et al. found that 61% of otorhinolaryngology (ENT) programs had ≥ 1 social media account as of June 2020, observing similarly large increases in Instagram/Twitter accounts during the COVID-19 pandemic⁹. In another study of ENT programs, Goshtasbi et al. found that 67% of Instagram accounts were created after March 2020, highlighting their increased utility during the pandemic⁸. These findings are in line with our own, where approximately two-thirds of programs had at least 1 social media account and nearly 90% of Instagram accounts were created during the pandemic.

Because the increased number of social media accounts among residency programs allows for more applicant-resident interaction, we also sought to explore the impact of reputation and rankings on account presence. As in our study, Xie et al. (ENT) and Azoury et al. (plastic surgery) reported that residencies with higher Doximity rankings or those affiliated with higher-ranked USNWR hospitals were more likely to have social media accounts with higher follower counts and activity^{21,22}. This was attributed to broader applicant awareness of historically prestigious hospitals and the desire to uphold their reputations through social media. Again similar to our results, Goshtasbi et al. reported that larger residency programs more often had Instagram accounts and had more followers/posts, which may be due to the need to recruit more residents and increased interest in larger programs with more positions⁸. These accounts are also windows into the more intangible aspects of residency, including resident life, program culture, research opportunities, and social justice initiatives^{23,24}.

Social media utilization by orthopaedic surgery residencies has likely benefited applicants tremendously. Even before COVID-19, >95% of plastic surgery applicants had a social media presence, and 73% followed a residency account²⁵. These accounts allow students to gain a better understanding of program culture and fit, which could lead to a more selective application list in line with recommendations from the American Orthopaedic Association Council of Residency Directors for the 2020 to 2021 application cycle²⁶. However, increased social media presence by programs must be balanced with the awareness of applicant account content. Ponce et al. reported that 85% of orthopaedic surgery applicants did not restrict public access to their accounts, and 16% of individuals had unprofessional content²⁷. This highlights the importance of social media etiquette although it is important to note that “unprofessional” content is a subjective distinction that could be particularly damaging to women and people of color⁶. Although the benefits of increased social media use by residency programs likely outweigh any

negatives, this double-edged sword may be difficult for applicants to navigate. Students should therefore be wary of their social media presence before following specific programs.

This study has several limitations. First, it is impossible to know if we fully captured the social media presence of all residencies/departments, although our systematic approach using various versions of “orthopedics” and common program acronyms (e.g., “PSU” for “Penn State University”) accounted for as many programs as possible. In addition, Instagram allows for the posting of “stories” that could not be counted toward the total number of posts or included for content characterization, which for some programs represented a common method of applicant interaction. For social media accounts with significant equal overlap in resident and department/patient content, we chose to tally such accounts under both the residency and department counts rather than arbitrarily choosing one, which minimally affected our totals. Last, our content categorization, while partly based on groupings used in similar studies, was not all-encompassing, although we feel the chosen categories accurately reflected the general themes observed.

Our study found that orthopedic surgery departments tend to use Facebook/Twitter most frequently, although there has been a dramatic increase in the number of Instagram accounts used by programs to interface with prospective applicants during the COVID-19 pandemic. In addition, departments affiliated with hospitals ranked in the USNWR top 50 and residencies in the Doximity top 20 were significantly more likely to have Facebook, Twitter, and Instagram accounts. Larger residency programs and those with higher Doximity rankings had a greater number of followers and received more likes and comments per post. Future studies could examine how social media presence influences the number of residency applications received and the quality and quantity of residents accepted into their program. ■

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