

Instagram as a Learning Tool in Neurology: A Prospective Study

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Abstract

Background: Since the beginning of the Covid-19 pandemic, there were remarkable changes in people's lifestyle with a tendency to spend more time on social media rendering its platforms essential in all fields. This study was designed to look at the potential role of Instagram as a learning tool in neurology among Saint Joseph University (Beirut, Lebanon) medical students.

Methods: This prospective study was spread over the period of 3 months, between the 10th of October and the 10th of December 2020. The target population was the medical students at Saint Joseph University (Beirut, Lebanon) in their 3rd to 7th academic year. The purpose was to evaluate the impact of the Instagram page called "La Synapse" on the students' answers to ten neurology multiple choice questions (MCQs) before and after their exposure to the page's content. The evaluation was done through a questionnaire conceived on Google Forms that also covered demographical characteristics, social media usage for educational purposes and their feedback post-exposure. In addition, we intended to evaluate the students' opinion on using social media as a learning tool. The results were analyzed by comparing the pre-exposure and post-exposure data.

Results: A total of 180 students were enrolled in the pre-exposure questionnaire (40% of the entire population) and 107 (59.44%) out of the initial group participated in the post-exposure questionnaire. Most students (81%) already used social media for educational purposes with YouTube being the most popular (51%). After exposure, 95% said to have profited from the experience but the junior students benefited more than the seniors. "Mnemonics" were the most practical learning strategy (44%) according to the participants. Regarding the MCQs, an improvement was found in seven out of the ten questions, with three having a statistically significant upswing ($p < 0,05$).

Conclusions: The Instagram page "La Synapse" was an efficient tool for transmitting neurological information to medical students. These results should encourage the development of future prospective studies to better explore the role of social media in medical education.

Background

Covid-19 pandemic and confinement caused remarkable changes in people's lifestyle with a tendency to spend additional time in front of screens (1). The use of social media (SM) contributes to this screen time, besides gaming and web browsing, essentially for adolescents and adults under the age of 25 (2). Social media platforms gained popularity ever since they were released back in 1995 with "Classmates Online Inc." because of their fast evolution and adaptation to match their users' needs. These platforms became a necessity in almost every domain to keep up with a world in perpetual evolution.

In the field of medicine, social media have many uses such as exchanging information in conferences (3) or to earn CME credits (4). They were also proven to be an important recruiting technique when the target population was far from reach or when the study conducted was of the observational type (5). Additionally, they are used by hospitals to promote new equipment and technologies acquired resulting in a more trustful medical staff-patient relationship (6) and finally they are used as tools for spreading awareness (i.e., cancer screening, chronic diseases, Covid-related information).

In the academic field, many conducted studies looked at the impact of social media on medical education and their use as a learning tool, but most of them fell in the descriptive and feedback-based categories (7) hence the need to further investigate these two subjects.

According to medical students, the most popular SM used as learning tools are YouTube followed by Facebook then Twitter (8). On the other hand, a study published in 2017 by the American College of Radiology explored the pros and cons of common social media platforms when used as an educational medium. A very positive feedback was given to Instagram for two main reasons: first, the caption's upper limit of 2200 characters (vs. 140 for Twitter) promoted a more explicit explanation and second, because of the ability to post a sequence of pictures, each with an independent caption, but all arranged as an album (9). In addition, Instagram has the advantage of having a detailed built-in analytics system.

Lately, we witnessed a cultural shift favoring it over Facebook (10). These reasons contributed to choosing Instagram as the social media for the current study in order to evaluate its effect as a learning tool in neurology among our institution's medical students. In addition, we intended to evaluate the students' opinion on using social media as a learning tool.

Methods

Part 1 - Planning of the study and sample population:

This prospective study was spread over the period of 3 months, between the 10th of October 2020 and the 10th of December 2020. The purpose was to look at the impact of exposing the medical students to the Instagram page called "La Synapse" through the administration of two questionnaires (cf supplementary file) separated by a two and a half months long period (before and after exposure).

The initial step was to recruit the biggest number of medical students at Saint Joseph University in Beirut (Lebanon) in their 3rd to 7th academic year by broadcasting a WhatsApp text message to their class administrative groups. The message comprised two links: the first, leading to the pre-exposure questionnaire and the second leading to the Instagram page "La Synapse" for them to follow. A reminder text message was sent afterwards for five consecutive days.

The chosen population included all medical students at Saint Joseph University (USJ) starting from 3rd year of medical school at USJ (equivalent to the final year of premed) to the 7th year (which is the 4th year of medical school, MedIV) who own an Instagram account. The reason behind that choice was the fact that in the French curriculum, neuroanatomy and neurophysiology are introduced in second year whereas neuropathology is initiated in the third.

The pre-exposure questionnaire was conceived on Google Forms and had three main sections: the first studying the demography of the population, the second focusing on the students' SM usage for educational purposes and the third consisting of ten multiple choice questions (MCQs) that helped draw a baseline level of their knowledge in neurology.

It is important to mention that ten students (two from each academic year) were randomly chosen prior to administrating of the pre-exposure questionnaire to participate to a pilot study in order to get their feedback regarding the level of difficulty and formulation of the MCQs.

The second step consisted of exposing the participants (for a duration of two and a half months) to a series of Instagram posts (including stories) shared by "La Synapse". These posts incorporated the answers to the MCQs in

addition to supplementary information in the field of neurology: anatomy, pathology, pathophysiology, therapeutics, and clinical vignettes.

The third step consisted of a post-exposure questionnaire made on Google Forms and shared via a WhatsApp text message to the administrative groups coupled to a daily reminder for the duration of five days. This questionnaire targeted students who already answered the initial questionnaire and had followed the Instagram page. It had three main sections: the population's demography, the participants' feedback regarding the content of the Instagram page and the same neurology MCQs as presented in the first questionnaire.

Of note that the initial recruiting technique was supposed to be done for all participants at once based on a questionnaire to be filled in class to limit the information bias and the students' access to search engines. Unfortunately, due to the Covid-19 pandemic, the governmental policies, and the university's restrictions, this was not applicable and both questionnaires were broadcasted via WhatsApp.

This study was approved by the ethics committee of Saint Joseph University - Beirut (number Tfem 2020/12). All methods were performed in accordance with our institution guidelines and all participants gave their consent prior to answering the first questionnaire. Results were analyzed anonymously.

The Instagram page "La Synapse":

This Instagram page was created for the sole purpose of this study. Its name was inspired from the actual role of a synapse in any living organism which is transmission of information.

A hashtag (#KeepTheInformationFlowing) was created too, and allowed, with the help of Instagram analytics, to keep track of the interaction between the students and the page.

Using the help of Instagram Analytics, every post was provided with the following data: a "Reach" (which is the number of accounts who have seen a post), "Impressions" (which is the number of times a post has been seen without taking into account the profile of the user. I.e., a single account looking at the same post thrice will generate 1 Reach and 3 Impressions), the number of times a post has been saved and finally the number of times the post was sent via direct message (DM) by any participant to another.

Two posts were published every week at 1:00 pm to maximize interaction (11). Moreover, "Stories" were published once a week and allowed students to answer questions and suggest new themes for the following weeks.

Part 2 - Statistical analysis:

The results were analyzed by comparing the pre-exposure and post-exposure data. Chi square statistics were used to test the hypotheses with a confidence interval of 95%. A comparison between the pre-exposure and post-exposure MCQs was made to determine the change in proportion of right answers.

In case of a statistically significant improvement in results ($p < 0.05$), factors that would theoretically affect the participants' choices in the pre-exposure questionnaire (such as the gender, the academic year, and the prior use of social media as a learning tool) were studied one at a time to evaluate their influence on the chosen answers. This was done to isolate the effect of the Instagram posts on the chosen answers.

Another table was then made based on the pre-exposure and post-exposure MCQs and was distributed according to the participants' academic year; this table helped comparing the performances between the different classes and determine which one had the highest profit from the intervention.

Finally, using Instagram Analytics, a table was generated to represent the interaction between the participants and the posts related to the MCQs' topics: this table contained the featured learning strategy, the number of Reaches, Impressions, saves and DMs. It facilitated studying the correlation between a higher number of views and better results as well as the effectiveness of each learning strategy.

Results

1 - Pre-exposure questionnaire:

1A – Demography:

In total, 180 students out of 456 (39.47%) answered the first questionnaire and were enrolled in the study; 89 (49%) of them were males and 91 (51%) females. Their distribution according to academic year is shown in figure 1.

1B – Social Media usage:

Out of the 180 participants, 146 (81.1%) already used social media for educational purposes. These 146 individuals were then asked questions regarding the frequency of usage (Fig. 2), the platforms they used (Fig. 3) and finally about their favorite social media (Fig. 4). Results are exposed in the corresponding figures.

All participants were asked to express their opinion regarding social media: 127 (70.6%) were in favor of using the Instagram platform as a learning tool whereas the rest were not and thought it was a form of distraction.

Concerning their knowledge on ethical restrictions related to using social media as a learning tool in medicine, 59.4% claimed having no information on the topic.

Students had also to pick a level of agreement to multiple statements (Table 1) regarding the importance of social media for communication between colleagues and the necessity of having more similar platforms in the upcoming years.

Table 1
Pre-exposure group's level of agreement to communication-related statements.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Hypothesis 1	43 (86.1%)	66 (36.7%)	17 (9.4%)	3 (1.7%)	11 (6.1%)
Hypothesis 2	75 (41.7%)	74 (41.1%)	15 (8.3%)	9 (5%)	7 (3.9%)
Hypothesis 3	69 (38.3%)	80 (44.4%)	23 (12.8%)	1(0.6%)	7 (3.9%)

1C – Pre-exposure MCQs:

The participants' answers to each of the 10 MCQs were divided into correct and incorrect answers, their distribution is shown in Table 2.

Table 2
Pre-exposure MCQs' answers.

		N	Percentage
Question 1 (TSE)	Incorrect Answers	32	17.8%
	Correct answers	148	82.2%
Question 2 (Met)	Incorrect Answers	98	54.4%
	Correct answers	82	45.6%
Question 3 (ALM)	Incorrect Answers	75	41.7%
	Correct answers	105	58.3%
Question 4 (NF2)	Incorrect Answers	111	61.7%
	Correct answers	69	38.3%
Question 5 (HSy)	Incorrect Answers	64	35.6%
	Correct answers	116	64.4%
Question 6 (BPa)	Incorrect Answers	32	17.8%
	Correct answers	148	82.2%
Question 7 (RFH)	Incorrect Answers	79	43.9%
	Correct answers	101	56.1%
Question 8 (DGB)	Incorrect Answers	138	76.7%
	Correct answers	42	23.3%
Question 9 (VRH)	Incorrect Answers	90	50.0%
	Correct answers	90	50.0%
Question 10 (DBM)	Incorrect Answers	95	52.8%
	Correct answers	85	47.2%

1D – Factors influencing the choice of answers for the pre-exposure MCQs:

1D.1 – The prior use of social media as a learning tool:

Table 3 shows the effect of a prior use of social media on the participants' answers in the pre-exposure questionnaire.

Table 3
Comparison of the pre-exposure MCQs' answers between prior users and non-users of SM as a learning tool.

		U		N-U		Odds Ratio			P-value
		N	%	N	%	Value	Min	Max	
Question 1 (TSE)	IA	8	23.50%	24	16.40%	0.639	0.259	1.581	0.33
	CA	26	76.50%	122	83.60%				
Question 2 (Met)	IA	18	52.90%	80	54.80%	1.077	0.510	2.277	0.845
	CA	16	47.10%	66	45.20%				
Question 3 (ALM)	IA	18	52.90%	57	39.00%	0.569	0.269	1.206	0.139
	CA	16	47.10%	89	61.00%				
Question 4 (NF2)	IA	22	64.70%	89	61.00%	0.852	0.391	1.854	0.686
	CA	12	35.30%	57	39.00%				
Question 5 (HSy)	IA	12	35.30%	52	35.60%	1.014	0.465	2.214	0.972
	CA	22	64.70%	94	64.40%				
Question 6 (BPa)	IA	6	17.60%	26	17.80%	1.011	0.38	2.69	0.982
	CA	28	82.40%	120	82.20%				
Question 7 (RFH)	IA	16	47.10%	63	43.20%	0.854	0.404	1.806	0.679
	CA	18	52.90%	83	56.80%				
Question 8 (DGB)	IA	24	70.60%	114	78.10%	1.484	0.644	3.423	0.352
	CA	10	29.40%	32	21.90%				
Question 9 (VRH)	IA	23	67.60%	67	45.90%	0.406	0.184	0.893	0.022
	CA	11	32.40%	79	54.10%				
Question 10 (DBM)	IA	18	52.90%	77	52.70%	0.992	0.47	2.095	0.983
	CA	16	47.10%	69	47.30%				

1D.2 – The gender effect:

There was no statistically significant difference in responses related to gender.

1D.3 – The academic year:

Details of answers related to each academic year are displayed in Table 4. We can conclude that 6 out of 10 MCQs (questions 1,2,3,7,8 and 10) demonstrated a statistically significant p-value regarding the impact of academic year on the chosen answers.

Table 4
Distribution of the pre-exposure MCQs answers according to the academic year.

		3rd year		4th year		5th year		6th year		7th year		P-value
Question 1 (TSE)	IA	0	57.70%	5	18.50%	10	26.30%	2	4.40%	0	0.00%	1.3.10 ⁻⁹
	CA	11	42.30%	22	81.50%	28	73.70%	43	95.60%	44	100.00%	
Question 2 (Met)	IA	19	73.10%	18	66.70%	26	68.40%	22	48.90%	13	29.50%	4.10 ⁻⁵
	CA	7	26.90%	9	33.30%	12	31.60%	23	51.10%	31	70.50%	
Question 3 (ALM)	IA	16	61.50%	12	44.40%	21	55.30%	16	35.60%	10	22.70%	0.001
	CA	10	38.50%	15	55.60%	17	44.70%	29	64.40%	34	77.30%	
Question 4 (NF2)	IA	10	38.50%	20	74.10%	28	73.70%	31	68.90%	22	50.00%	0.849
	CA	16	61.50%	7	25.90%	10	26.30%	14	31.10%	22	50.00%	
Question 5 (HSy)	IA	12	46.20%	8	29.60%	11	28.90%	21	46.70%	12	27.30%	0.481
	CA	14	53.80%	19	70.40%	27	71.10%	24	53.30%	32	72.70%	
Question 6 (BPa)	IA	5	19.20%	6	22.20%	6	15.80%	9	20.00%	6	13.60%	0.513
	CA	21	80.80%	21	77.80%	32	84.20%	36	80.00%	38	86.40%	
Question 7 (RFH)	IA	20	76.90%	11	40.70%	22	57.90%	16	35.60%	10	22.70%	2.1.10 ⁻⁵
	CA	6	23.10%	16	59.30%	16	42.10%	29	64.40%	34	77.30%	
Question 8 (DGB)	IA	14	53.80%	17	63.00%	33	86.80%	41	91.10%	33	75.00%	0.008
	CA	12	46.20%	10	37.00%	5	13.20%	4	8.90%	11	25.00%	
Question 9 (VRH)	IA	17	65.40%	12	44.40%	23	60.50%	15	33.30%	23	52.30%	0.192
	CA	9	34.60%	15	55.60%	15	39.50%	30	66.70%	21	47.70%	
Question 10 (DBM)	IA	22	84.60%	11	40.70%	17	44.70%	28	62.20%	17	38.60%	0.019
	CA	4	15.40%	16	59.30%	21	55.30%	17	37.80%	27	61.40%	

2 – Post-exposure questionnaire:

2A – Demography:

Out of the 180 initial responders, 107 (59.44%) completed the second questionnaire (53% were males and 47% females). The distribution according to the academic year: 19 (17.7%) were in 3rd year, 18 (16.8%) in the 4th, 16 (14.9%) in the 5th, 18 (16.8%) in the 6th, and 36 (33.6%) in the 7th .

2B – Instagram page feedback:

Participants were first asked to pick their favorite learning strategy amongst the ones used by “La Synapse”: mnemonics came in first place (44%) followed by clinical vignettes (32%), word-image associations (17%) then stories (7%).

Three “yes or no questions” were then asked to see whether the page helped them learn new information, recall previously acquired knowledge and finally to assess the need of similar platforms for the future. All three questions came back with a 95–97.2% positive feedback.

2C – Post-exposure MCQs:

The participants’ answers to each of the 10 MCQs were divided into correct and incorrect answers and are shown in Table 5.

Table 5
Post-exposure MCQs’ answers.

		N	Percentage
Question 1 (TSE)	Incorrect Answers	19	17.8%
	Correct answers	88	82.2%
Question 2 (Met)	Incorrect Answers	54	50.5%
	Correct answers	53	49.5%
Question 3 (ALM)	Incorrect Answers	14	13.1%
	Correct answers	93	86.9%
Question 4 (NF2)	Incorrect Answers	32	29.9%
	Correct answers	75	70.1%
Question 5 (HSy)	Incorrect Answers	25	23.4%
	Correct answers	82	76.6%
Question 6 (BPa)	Incorrect Answers	22	20.6%
	Correct answers	85	79.4%
Question 7 (RFH)	Incorrect Answers	38	35.5%
	Correct answers	69	64.5%
Question 8 (DGB)	Incorrect Answers	83	77.6%
	Correct answers	24	22.4%
Question 9 (VRH)	Incorrect Answers	42	39.3%
	Correct answers	65	60.7%
Question 10 (DBM)	Incorrect Answers	44	41.1%
	Correct answers	63	58.9%

On the other hand, a distribution of the answers was displayed according to the academic year in order to compare the performances across class levels. Results are shown in Table 6.

Table 6
Distribution of the post-exposure MCQs' answers according to the academic year.

		3rd year		4th year		5th year		6th year		7th year		P-value
Question 1 (TSE)	IA	7	36.8%	5	27.8%	2	12.5%	2	11.1%	3	8.3%	0.005
	CA	12	63.2%	13	72.2%	14	87.5%	16	88.9%	33	91.7%	
Question 2 (Met)	IA	15	78.9%	13	72.2%	11	68.8%	10	55.6%	5	13.9%	3.2.10 ⁻⁷
	CA	4	21.1%	5	27.8%	5	31.3%	8	44.4%	31	86.1%	
Question 3 (ALM)	IA	4	21.1%	4	22.2%	3	18.8%	3	16.7%	0	0.0%	0.011
	CA	15	78.9%	14	77.8%	13	81.3%	15	83.3%	36	100.0%	
Question 4 (NF2)	IA	5	26.3%	6	33.3%	6	37.5%	4	22.2%	11	30.6%	0.981
	CA	14	73.7%	12	66.7%	10	62.5%	14	77.8%	25	69.4%	
Question 5 (HSy)	IA	4	21.1%	3	16.7%	7	43.8%	3	16.7%	8	22.2%	0.993
	CA	15	78.9%	15	83.3%	9	56.3%	15	83.3%	28	77.8%	
Question 6 (BPa)	IA	6	31.6%	5	27.8%	5	31.3%	1	5.6%	5	13.9%	0.041
	CA	13	68.4%	13	72.2%	11	68.8%	17	94.4%	31	86.1%	
Question 7 (RFH)	IA	10	52.6%	6	33.3%	7	43.8%	4	22.2%	11	30.6%	0.109
	CA	9	47.4%	12	66.7%	9	56.3%	14	77.8%	25	69.4%	
Question 8 (DGB)	IA	9	47.4%	15	83.3%	13	81.3%	14	77.8%	32	88.9%	0.045
	CA	10	52.6%	3	16.7%	3	18.8%	4	22.2%	4	11.1%	
Question 9 (VRH)	IA	12	63.2%	5	27.8%	7	43.8%	5	27.8%	13	36.1%	0.140
	CA	7	36.8%	13	72.2%	9	56.3%	13	72.2%	23	63.9%	
Question 10 (DBM)	IA	11	57.9%	8	44.4%	4	25.0%	9	50.0%	12	33.3%	0.156
	CA	8	42.1%	10	55.6%	12	75.0%	9	50.0%	24	66.7%	

3 – Instagram Analytics:

The gathered data by Instagram Analytics is shown in Table 7. The posts with the highest Reach and Impressions were those of questions 3, 4 and 5. On the other hand, the posts that triggered the highest number of interactions were the mnemonic for Horner's Syndrome (question 5) and Bell's palsy's clinical vignette (question 7).

Table 7
Data gathered by Instagram Analytics during the period of exposure.

Question	Learning Strategy	Reach	Impressions	Saves	Messages
Q1 (TSE)	Mnemonic	167	256	2	1
Q2 (Met)	Story	152	166	N/A	N/A
Q3 (ALM)	Mnemonic	176	294	0	1
Q4 (NF2)	Word-image association	175	285	1	0
Q5 (HSy)	Mnemonic	169	260	1	2
Q6 (BPa)	Clinical vignette	161	233	3	1
Q7 (RFH)	Mnemonic	155	212	2	0
Q8 (DGB)	Story	146	158	N/A	N/A
Q9 (VRH)	Mnemonic	163	232	2	0
Q10 (DBM)	Story	159	184	N/A	N/A

Table 8 summarizes the improvement in the numbers of accurate answers between the pre and post-exposure questionnaires. There was a statistically significant improvement regarding the question 3, 4 and 5 (p-values < 0.05) and a trend for questions 9 and 10.

4 – Pre and post-exposure MCQs comparison:

Table 8
The improvement in correct answers between pre and post exposure.

	% of correct answers			p-value
	Pre-exposure	Post-exposure	Improvement	
Q1 (TSE)	82.2%	82.2%	0%	0.996
Q2 (Met)	45.6%	49.5%	+ 3.9%	0.514
Q3 (ALM)	58.3%	86.9%	+ 28.6%	4.10^{-7}
Q4 (NF2)	38.3%	70.1%	+ 31.8%	10^{-7}
Q5 (SyH)	64.4%	76.6%	+ 12.2%	0.031
Q6 (PaB)	82.2%	79.4%	-2.8%	0.56
Q7 (RFC)	56.1%	64.5%	+ 8.4%	0.163
Q8 (DGB)	23.3%	22.4%	-0.9%	0.86
Q9 (ViR)	50%	60.7%	+ 10.7%	0.077
Q10 (MDB)	47.2%	58.9%	+ 11.7%	0.056

Discussion

The study was designed prior to the Covid-19 pandemic with a goal to explore the impact of an Instagram page on neurology education in premed and medical students. The results will be discussed in terms of their importance but also relevance, especially after the shift of the major part of the medical education to online teaching.

Lately, it became very important to find attractive and interesting ways of transmitting medical knowledge while encouraging students, stimulating their metacognition, and keeping them constantly motivated. First, let us start by reviewing the response rates for the pre and post page exposure evaluations. These were respectively 40 % then 60 % (of the initial group) and were overall satisfying and representative of the targeted population.

Despite the change of lifestyle due to the pandemic and the 22 % positivity rate for Covid among our students during the same period, we were able to motivate them to participate in the questionnaires and to follow “La Synapse”.

Part 1: MCQs

After analyzing the pre and post exposure data looking at the answers of the MCQs, we found an improvement in 7 out of the 10 questions but this rise was significant in only 3 of them: an upswing of 28.6% ($p = 4.10^{-7}$) was found in question 3 (anatomy of the foramina of Luschka and Magendie); 31.8% ($p = 10^{-7}$) for question 4 (neurofibromatosis type 2) and 12.2% ($p = 0.031$) for question 5 (pathophysiology of the Horner syndrome).

If we analyze the results while taking into consideration the teaching value of the Instagram posts, the data provided by Tables 3 and 4 show that all the factors that could potentially affect the choice of answers had no significant impact on questions 3, 4 or 5 except for the factor “academic year” for question 3 ($p = 0.001$), thus demonstrating the important influence that the Instagram posts had on the choice of answers.

Since the factor “academic year” affected 6 out of the 10 MCQs in the pre-exposure questionnaire and 5 in the post-exposure questionnaire, it would be interesting to compare the results of Table 4 and 6 in order to evaluate the improvement in performance according to each class level: in Table 4 (pre-exposure), the 7th year students had the highest scores on almost all the questions except for question 2 (neurofibromatosis type 2) and question 8 (diagnosis of Guillain-Barré) where the 3rd year students did better. These results reflect the “traditional” learning curve followed by medical students through their journey in medical school: in the earlier years, the main interest is focused on the details of semiology and pathophysiology (hence their results on questions 2 and 8) whereas at a later stage, the focus shifts towards the main clinical features, treatments, and guidelines (hence the perfect score on question 1 for the 7th year students).

In Table 6 (post-exposure), we also find the highest scores being those of the 7th years’ but what was interesting was the progress of knowledge among the younger classes (3rd and 4th years) related to topics that are out of their comfort zone; for instance, a 21% improvement occurred in question 1 (treatment of status epilepticus) in the youngest class (Table 8). In fact, this satisfies the main goal of our study: facilitating teaching and improving knowledge of neurological emergencies management in a pleasant setting.

Overall, the Instagram posts generated improvements in all classes but at different degrees: the junior students gained more than the seniors, and that could be the consequence of a heavier workload once medical students

start their hospital rotations resulting in less social media time, or due to the shift of the information selection process as students advance in their medical studies.

It is also important to note that question 8 (diagnosis of Guillain-Barré Syndrome or GBS) got the lowest results in both pre (23.4%) and post-exposure (22.4%) questionnaires. The persistence of low scores could be explained by the level of complexity of the question, the difficulty of the diagnosis or the poor exposure on the Instagram page (question 8 got the lowest “Reach” and “Impressions” numbers – Table 8).

Either way, the necessity of mentioning this condition even more during the medical curriculum is essential to spread awareness especially for the older classes who are going through their first clinical rotations in these critical Covid-19 times (12).

Part 2:

2A – The use of social media as a learning tool among medical students:

Social media has been growing in popularity especially among the younger generation enrolling in medical school: the number of prior users and their frequency of usage is superposable to those of Saudi Arabia (8): around 80% of students already used social media for their education prior to the study and more than half of them claimed a daily usage.

Concerning the platforms’ popularity, YouTube was the favorite with 33% which is similar to the study conducted by Al Suraihy et al. (8) and the one in King Saud University (13) followed by Instagram (25%) and Google+ (17%). The main difference between the results generated by this study and the one from Al Suraihy et al. (8) is the popularity of Facebook: 17% v/s 2% in the current study. This could be the result of a shift in preferences of the younger generation lately with a tendency to go towards trendier applications (10) such as YouTube and Instagram to satisfy their needs or due to cultural or social preferences.

2B – Ethical implications related to social media use as a learning tool:

Regarding the ethical restrictions related to using social media as a learning tool, more than half of the study population (59%) was not aware of them. This could be secondary to a lack of awareness on this subject: Instagram, like many other social platforms is not subject to thorough peer-review (14) therefore using it as part of the medical field is tied to ethical obligations in order not to break the Doctors’ Oath: the patients’ anonymity should always be preserved while discussing clinical cases (15). On the other hand, the interactions with patients should always be professional in order not to affect the doctor-patient balance (16) and finally the accidental defamation of a colleague or a conflict of interest could have social and legal repercussions.

2C – Students’ feedback on the Instagram page “La Synapse”:

Concerning the section dedicated to the learning strategies, mnemonics were the most popular (44%) and most effective among our medical students. This technique helps not only with learning, but also with recalling and consolidating information (17).

On the other hand, the least popular used learning strategy were the MCQs in the Instagram stories (7%). To further support this statement, Instagram Stories generated the lowest number of Reaches and Impressions and lead to relatively poor improvements in results. This might have been caused by the limited exposure or viewing time (24 hours period) for participants.

Finally, by comparing the participants' feedback in the pre and post-exposure questionnaires, we find a 12.3% increase in the need of similar platforms for the future. This was obtained by combining the answers "strongly agree" and "agree" from Table 1 – hypothesis 3 and the post-exposure feedback questionnaire results (95%). More platforms would further facilitate the communication between students, help disseminate evidence on trending and rapidly changing subjects (18), share scholarly information especially in visually rich specialties (19) and measure the public interest towards one's academic accomplishments (20).

3 – Limitations:

Concerning the logistic limitations discussed earlier, the main setback was the students' easy access to search engines while answering the MCQs; to limit this information bias, we sent a text message with the questionnaires to motivate the participants. We respected anonymity knowing that some statistical power will be lost. Identifying and tracking the participants would have allowed us to trace the individual progress instead of comparing the results generated by two independent series but we opted for the latter one to have a more objective analysis.

Conclusions

Social media became an essential part of today's world, not only because of the perpetual technological advances, but also because of the imposed "virtual" life that came along the Covid-19 pandemic. Nowadays, all fields are making the best out of this tool to create a communication net to spread information within the community and this is being applied to the medical field as well.

As we previously mentioned, our page appellation was inspired from the role of a synapse in any living organism, and it is crucial to retain that this flow of information would never go through without a pre-synaptic neuron, ready to transmit, and a receptive post-synaptic neuron, ready to be stimulated. This study has shown that the Instagram page "La Synapse" was an efficient and promising tool to transmit neurological information to medical students. It should encourage the development of future prospective studies to better explore the role of social media in medical education.

Abbreviations

Covid-19: Coronavirus disease 2019

DM: Direct message

MCQs: Multiple choice questions

SM: Social Media

Declarations

Ethics approval was obtained from the ethics committee of Saint Joseph university and consent to participate was obtained from all participants.

Consent for publication: not applicable.

Availability of data and materials: available. The datasets generated and analyzed during the current study are available in the supplementary file repository under “raw data”.

Competing interests: not applicable.

Funding: none.

Authors' contributions:

1) GTB performed the study follow up, data collection, analysis, and drafting manuscript.

2) KAK developed study concept and design, data analysis and manuscript writing.

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Figures

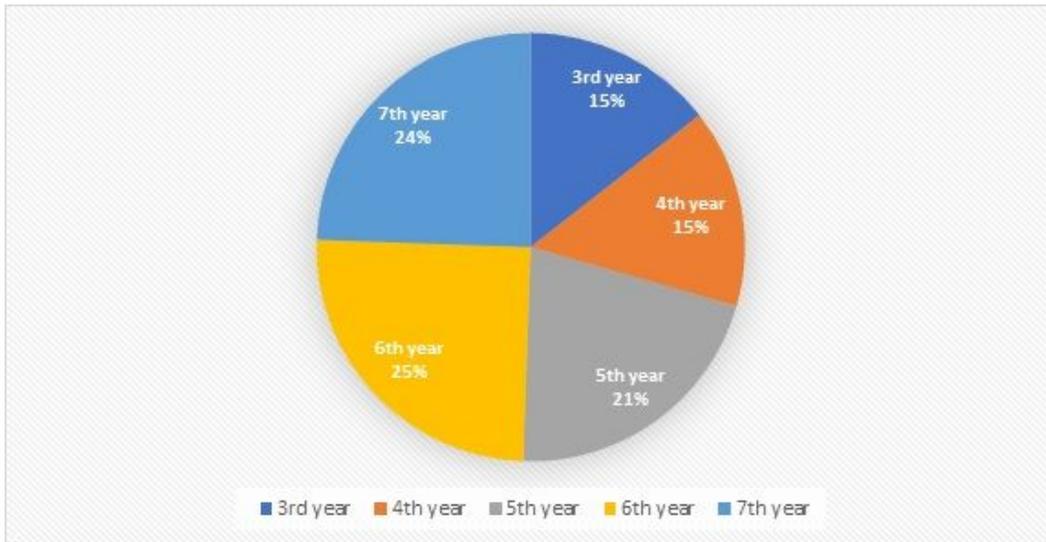


Figure 1

Pre-exposure group distribution according to the academic year.

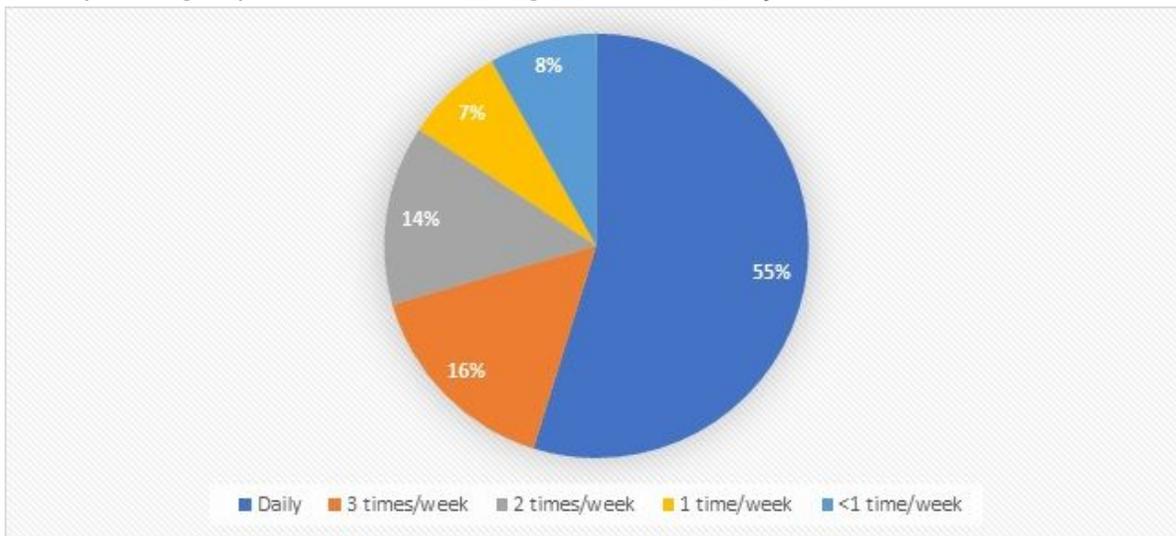


Figure 2

Frequency of usage of SM by the users' group.

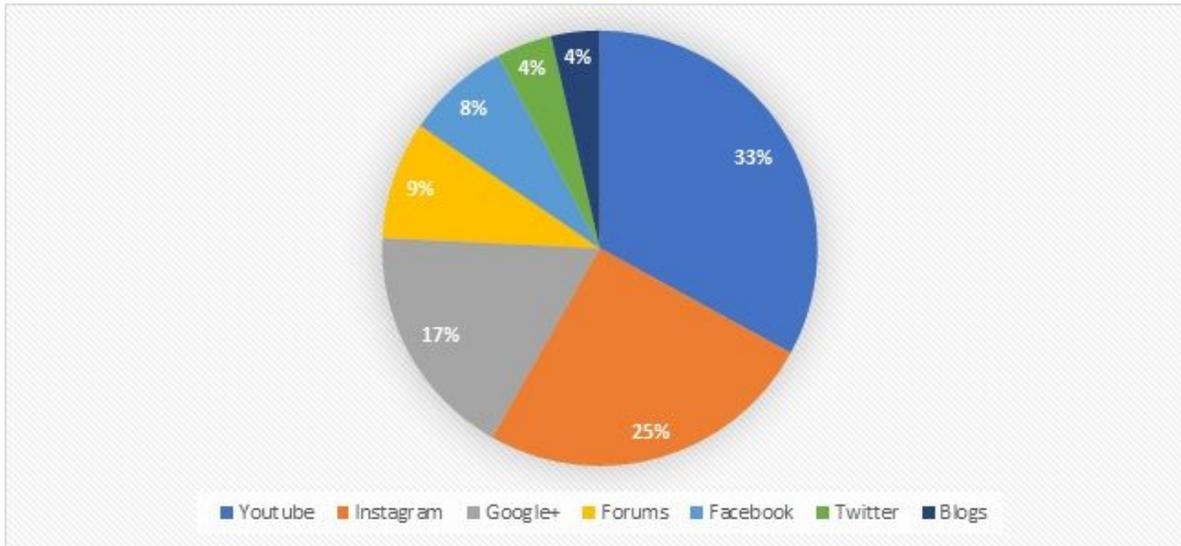


Figure 3

SM used by the users' group for educational purposes.

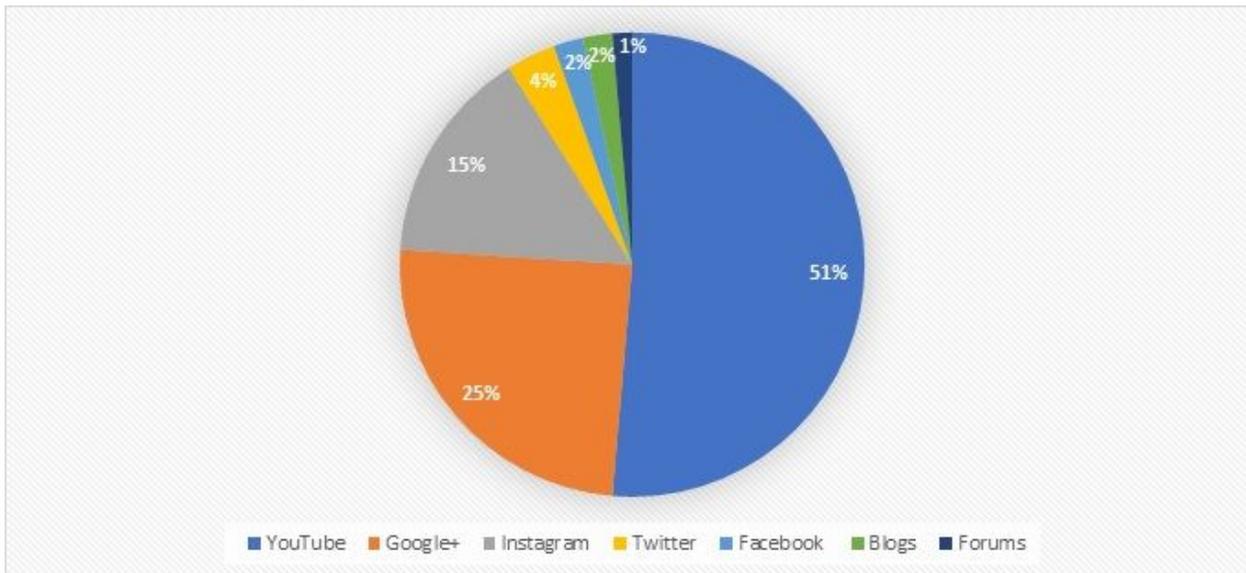


Figure 4

Favorite SM used for educational purposes.

Supplementary Files

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