



SPECIAL ARTICLE

Sharing knowledge on Hepatology in times of change, or, why you should be on Twitter[☆]Álvaro Díaz-González^a, Miguel Ángel Rodríguez-Gandía^b, Juan Turnes^{c,*}^a Servicio de Aparato Digestivo, Hospital Universitario Marqués de Valdecilla, Instituto de Investigación Sanitaria Valdecilla (IDIVAL), Santander, Spain^b Servicio de Gastroenterología y Hepatología, Hospital Universitario Ramón y Cajal, IRyCIS, Madrid, Spain^c Servicio de Aparato Digestivo, Complejo Hospitalario Universitario de Pontevedra, IIS Galicia Sur, Pontevedra, Spain

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Abstract The ways in which information is shared, regardless of its origin, are constantly undergoing major changes. These shifts affecting how people interact and exchange knowledge have been subject to disruptive changes in recent years, due to the possibilities created by social media. The SARS-CoV-2 pandemic has exponentially accelerated these changes and innovations. In health and biomedical settings, Twitter is a key tool. This document aims to depict and describe the nascent opportunities in the field of knowledge dissemination and research on hepatology.

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PALABRAS CLAVE

Twitter;
Hepatología;
#livertwitter;
Comunicación

La difusión del conocimiento en Hepatología en tiempos de cambio o por qué deberías estar en Twitter

Resumen La difusión del conocimiento en hepatología, y la interacción entre pares, está viviendo un cambio disruptivo en los últimos años propiciado por las capacidades que ofrecen las redes sociales, que en el ámbito sanitario y de investigación biomédica se están organizando en Twitter. Estos cambios se han acelerado siguiendo un patrón exponencial durante la pandemia de SARS-CoV-2. Este artículo analiza estos cambios y las oportunidades que se están abriendo en el ámbito de la difusión del conocimiento e investigación en Hepatología.

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Human beings are social by nature. This sociability is reflected in the establishment of networks for interaction with family members, friends, work colleagues and so on. This means that developing networks for social interaction is a genuinely human act. However, up to the appearance of what are now known as social networks (Facebook, Twitter, YouTube, Instagram, etc.), these interactions were limited to third parties accessed through personal contact in a physical environment. And this is precisely what the revolution of digital social networks consists of: the capacity for interaction without any spatial, temporal or personal limitations.

Each of the social networks mentioned has its own particular characteristics. Twitter is the tool most commonly used by health science researchers around the world. This social network is characterised by its concise messages: the information to be conveyed must be packed into 280 characters. There is also the option of framing a tweet within a conversation by using a hashtag (“#”) or even addressing a person directly by putting the “@” symbol in front of that person’s username (Table 1 features a compilation of the terms most commonly used on Twitter). The dynamism and capacity for multidimensional interaction offered by this social network provides for heightened exposure and connectivity among users, translating to a heightened presence, greater visibility and more opportunities for personal and professional development.

In hepatology and gastroenterology, social networks in general, and Twitter in particular, have taken on a great deal of importance in recent years. The matter is such that the main Spanish scientific associations in these fields, such as the Asociación Española para el Estudio del Hígado (AEEH, @AEEHLiver) [Spanish Association for the Study of the Liver], the Asociación Española de Gastroenterología (AEG, @aegastro) [Spanish Association for Gastroenterology], the Sociedad Española de Patología Digestiva (SEPD, @sepdigestiva) [Spanish Association for Gastrointestinal Disease] and the Grupo Español de Trabajo en Enfermedad de Crohn y Colitis Ulcerosa (GETECCU, @geteccu) [Spanish Working Group on Crohn’s Disease and Ulcerative Colitis], are highly active on Twitter. One of the essential objectives of these scientific associations is to discuss the most important scientific advances at the national level. Their respective annual conferences are the epitome of this objective. However, certain personal and professional circumstances may limit

attendance at such conferences. Twitter, used by scientific associations, is the perfect tool to address this limitation. Finally, it should be noted that there is a growing movement among different gastrointestinal departments, and even units, towards using Twitter not only as a platform for sharing the results of various research studies and projects, but also as a medium for sharing concerns, circulating useful information for patients and promoting healthy behaviours.

What Twitter is for

One of Twitter’s features is its versatility. The way in which it is used can be adapted to whatever particular objective one has in mind for it, whether personal or professional.

Dissemination of research results

Most indexed scientific journals share their new publications through Twitter. As a general rule, a study is posted to Twitter within the month in which it is published. Furthermore, journals themselves are commonly seen to retweet these messages with a certain regularity, with the goal of reaching the largest possible audience. While such messages are usually *aseptic* and devoid of any interpretation or opinion, they do often spark enriching debates.

By way of example, the mean number of daily tweets made by the *Journal of Hepatology* (@JHepatology) is around five; all of them refer to articles published in the journal. More than 40% of the journal’s posts to the social network get retweeted, giving the journal a bigger megaphone and enlarging its potential audience. Other journals with similar scientific impact show comparable numbers. Conversely, the less active an account is on the social network, the less it will interact with its audience and the less its content will circulate. An analysis of activity on Twitter between January 2019 and June 2020 from the two most important journals in the field of hepatology showed that the journal *Hepatology* (@HEP_Journal) had a lower mean number of daily tweets @JHepatology (0.28 versus 4.61), correlating with a lower number of retweets and, therefore, less dissemination¹ (Table 2).

Table 1 Glossary of Twitter terms.

Term	Definition
Tweet	Message of up to 280 characters posted on the social network Twitter.
Retweet	Act through which a user reposts a tweet created by another user to give it visibility. It does not indicate agreement with the tweet’s message.
Like	Highlight a user’s message to raise its profile. In general (not always), it indicates agreement with the original message.
Mention	Adding the @ symbol in front of a user’s name in a tweet automatically generates a message notifying said user that they have been mentioned.
Hashtag	A label or tag that groups different messages (tweets) around this shared classification.
Thread	Series of linked tweets by a single user on a specific topic.
Forum	Conversation, whether spontaneous or planned, among multiple users on a specific topic, generally around a hashtag.
Tweetorial	Informational thread on a topic created by an expert in the field or with relevant knowledge in the area.

It is important to point out that the consequences of Twitter activity are no small thing: the larger the number of tweets and retweets, the larger the number of citations in scientific journals.²⁻⁵ A recent randomised trial revealed that scientific publications shared through this social network had a higher probability of being cited and greater dissemination, witnessed through an increase in Altmetrics results ($\times 8$) and Mendeley readings ($\times 3$).^{4,6} The repercussions are very real.

Measurement of results

Most scientists are familiar with the h-index, the number of citations and the impact factor. These are parameters used to evaluate the impact of journals, researchers and projects. Likewise, there are tools for measuring the impact of scientific output on digital platforms. Altmetrics consists of a set of measurement tools used to measure this impact. This metric evaluation, among others, compiles the number of interactions with a piece of content, the number of downloads, the number of shares on social networks, the number of likes and even the number of times a piece of content has been saved as a reference in citation managers such as Mendeley,⁷ all in real time. Consequently, many scientific journals incorporate this multidimensional metric into their published articles and even rank the articles with the highest scores.

Tweetorials

Another of the new words included in the glossary for Twitter users is "tweetorial", which is simply a portmanteau of the words "tweet" and "tutorial". Tweetorials are a product of adapting classic scientific conferences to this social network. In them, authors summarise the scientific evidence available on a given topic in several tweets and usually accompany them with multimedia content in the form of images and graphs. This sort of bite-size knowledge can be revised at any time. It is also possible to interact with the author of a tweetorial.

This new way of sharing knowledge emerged in late 2017 and, since then, has enjoyed exponential growth. It has become so popular that, at present, more than 6,000 tweets in the form of tweetorials are shared per month.⁸ Their impact has been so substantial that it led Anthony c. Breu (@tony.breu), probably one of the most prolific users in the area of tweetorials, to publish an article on the subject in the *New England Journal of Medicine*.⁹

Organised forums for discussion

These organised forums are, inarguably, a direct consequence of tweetorials. They represent their natural evolution. Tweetorials are characterised by not following a specific pattern in terms of time, date or topic. Their authors publish them at the most appropriate time for them on the topic that, in general, interests them at a given moment. Organised forums, on the other hand, do attempt to structure knowledge transmission: they are nearly always held at the same time and the content is announced well in

Table 2 Analysis of the impact of the journals *Journal of Hepatology* and *Hepatology* (data obtained through the Twitonomy application; <https://www.twitonomy.com>).

	<i>Journal of Hepatology</i> <i>Hepatology</i>	
Period	1 January 2019 to 29 June 2020	
Total tweets	2,517	151
Daily tweets	4.61	0.28
Original tweets	40.13%	37.75%
retweeted by third parties		
Tweets liked by third parties	48.55%	41.72%
Impact factor (JCR 2019)	20.58	14.68

advance. This organisational model yields greater real-time interaction between Twitter users, resulting in a richer, more in-depth live discussion.

The first organised forum on Twitter in our specialisation, @MondayNightIBD (#MondayNightIBD), adopted this model. In May 2019, the organisers posted their first tweet and hosted their first forum, featuring a debate on the management of pouchitis in patients with inflammatory bowel disease. That first organised event brought together a few scientists interested in the topic. Since then, this initiative has only grown. Indeed, it now has more than 4,500 unique followers on Twitter, and is highly active, with a mean of 6.2 tweets per day and a substantial capacity for dissemination, given that 24% of its tweets are shared by other users.¹⁰ Since 2020, it has offered the option of earning continuing education credits, which gives an idea of the disruptive effect of these activities. In December 2019, the account @GIJournal came into being with the goal of leading discussions encompassing all aspects of our specialisation. Finally, the latest to adopt this format was @ScopingSundays (#ScopingSundays), which seeks to promote discussion around advances and areas of debate in gastrointestinal endoscopy.

When content is planned and schedules are fixed, gastroenterology and hepatology professionals are able to organise, connect and participate actively on a global scale: inflammatory bowel disease is discussed on @MondayNightIBD on Mondays at 10.00 p.m.; topics relating to the gastrointestinal tract are addressed on @GIJournal on Wednesdays at 3.00 a.m.; and gastrointestinal endoscopy is debated on @ScopingSundays on Sundays at 8.00 p.m. (all times correspond to the mainland Spain time zone).

Scientific conferences

Although it may seem unlikely, at present, more content from a conference is shared on Twitter than at the conference itself. Oral presentations usually correspond to the papers most highly valued by the scientific committee. The mere fact that they are presented orally with the support of multimedia materials achieves greater dissemination and interest. However, until studies are published (if they are ultimately published), most of these oral presentations hold a tenuous place in the memories of the attendees. In this sense, social networks are the perfect tool: not only do

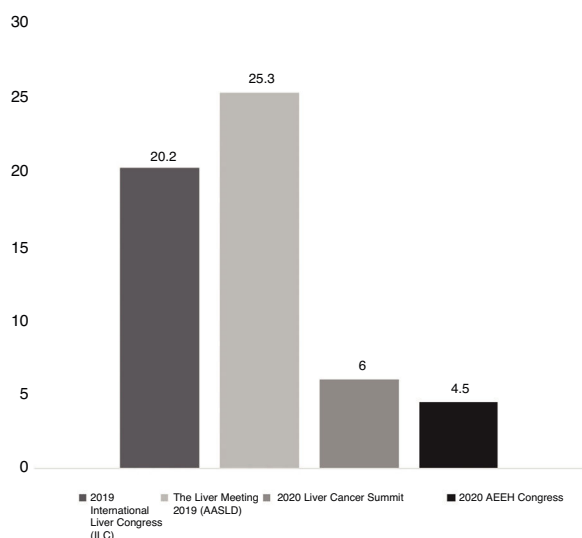


Figure 1 Number of tweet views (impressions) during conferences, expressed in millions. Information obtained and analysed using the Symplur Signals software program (<https://www.symplur.com>).

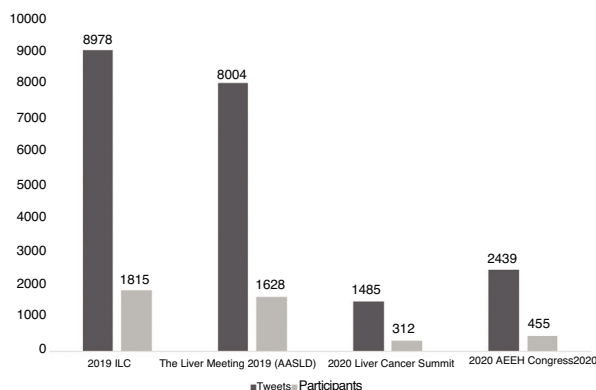


Figure 2 Dissemination of content presented at the 2019 annual conference of the American Association for the Study of Liver Diseases (AASLD), the 2019 annual conference of the European Association for the Study of the Liver (EASL), the 2020 annual conference of the Asociación Española para el Estudio del Hígado (AEEH) [Spanish Association for the Study of the Liver] and the 2020 Liver Cancer Summit of the EASL. Dissemination measured in terms of numbers of tweets and active users. Information obtained and analysed using the Symplur Signals software program (<https://www.symplur.com>).

researchers themselves share their results, but also attendees spontaneously take responsibility for sharing whatever they consider most relevant. Furthermore, this dissemination format greatly favours those studies presented in the form of posters, which are all too often overlooked at conferences.

Activity on Twitter is of such magnitude during conferences that tweet views are measured in millions. For example, at the latest AEEH conference, in 2020, there were more than 2,400 tweets with the hashtag #AEEH2020, and they achieved more than 4.5 million views (Figs. 1 and 2). Another recent example of large-scale dissemination through Twitter was the Liver Cancer Summit

organised by the European Association for the Study of the Liver (@EASLedu). At this summit, tweets with the hashtag #LiverCancerSummit attracted more than six million views (Figs. 1 and 2) and enabled higher levels of interaction, discussion and dissemination among attendees and non-attendees alike than the summit itself. The same can be observed of the major international conferences organised by the EASL and the American Association for the Study of Liver Diseases (AASLD), which in 2019 exceeded 20 million views and had close to 2,000 participants (Figs. 1 and 2). What was most notable was not just the numbers but the level of interaction among the participants in completely cross-cutting, interconnected discussions generated in real-time, as shown in Fig. 3 in reference to the AEEH conference in February 2020.

Bearing all of this in mind, the capacity for dissemination of conferences transcends in-person events themselves and translates to rich benefits for the scientific community as well as for scientific associations.

Networking

The more the activity on Twitter, the greater the interaction. The greater the interaction, the greater the visibility. The greater the visibility, the greater the opportunities. This social network offers opportunities that are difficult to access through other routes. Networking is a particularly attractive element of scientific conferences. Coffee breaks, chance meetings in corridors and lunchtimes are situations that facilitate this interaction, sometimes sparking brilliant ideas that translate to extraordinary collaborative efforts. However, physical proximity in a particular place at a particular time is a condition *sine qua non* of traditional networking. Twitter overcomes all of these barriers. What is more, virtual interaction facilitates collaboration between researchers, since it mitigates the effects of shyness and connects people regardless of constraints imposed by geographic location and time. With this objective, in January 2018, hepatologist (and prolific Twitter user) Elliot Tapper (@ebtapper) started the hashtag #LiverTwitter.¹¹ Since then, the use of this hashtag has spread around the world and many conversations concerning liver diseases are tagged with it. Interaction between scientists interested in diseases of the liver is such that tweets with the hashtag #LiverTwitter exceed a mean of 6,000 monthly, with close to 2,500 active users and more than 41 million impressions (data corresponding to June 2020 obtained through Symplur Signals). Moreover, this interaction among physicians with common interests has given rise to research projects, the results of which have been published in articles in high-impact journals.¹² Without a doubt, this is one more illustration of the unlimited opportunities that social networks can offer.

What is happening with hepatology on Twitter?

In Spain, SARS-CoV-2 has changed everything since its arrival in the country. One of the areas that it has impacted the most is healthcare communication. It may be recalled how medical conferences were the first events to be cancelled, but information, in all its formats, has been available in enormous quantities.

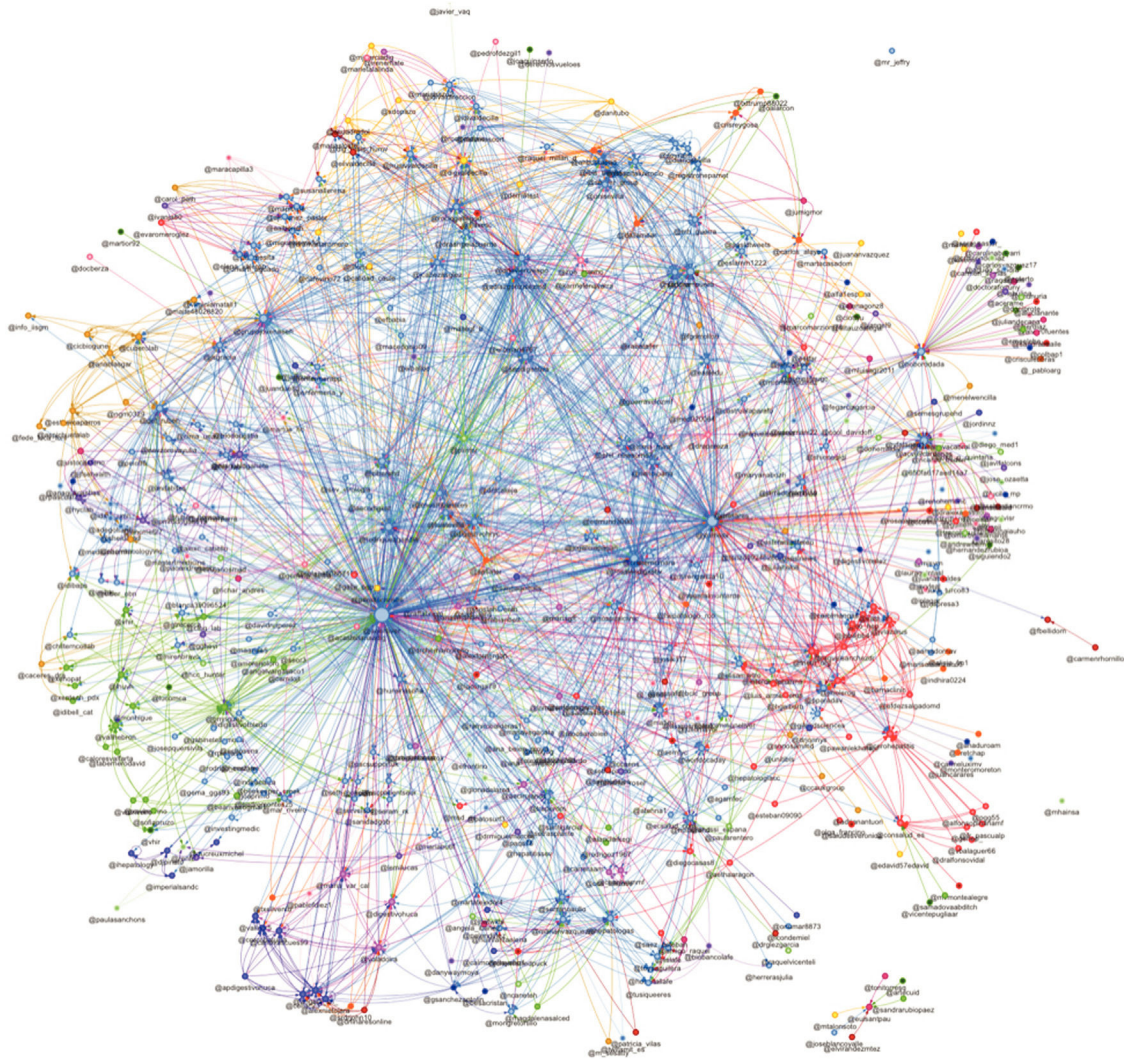


Figure 3 Graphic representation of the network of Twitter users who used the hashtag #AEEH2020 between 10 and 14 February 2020. The data were obtained and analysed using the SocioViz software program (<https://socioviz.net>).

Although those of us doctors who still rely on stethoscopes and abdominal percussion are not entirely clear about what “telemedicine” is, the need to adapt to circumstances has led us to new ways of communicating with colleagues and transmitting knowledge.

On Twitter, in a process that has been at once surprising and improvisational, “threads” of enormous interest have emerged, working groups have formed and, after various “#hashtags”, we have found answers to questions we hadn’t even asked ourselves yet. Particularly worthy of note in the field of hepatology is the hashtag #LiverTwitter, which has become the most active, dynamic medical forum in the specialisation at present. In that forum, highly renowned experts mingle with newer hepatologists. Every month, thousands of users make contributions and drive the use of this social network as a tool for learning and information dissemination.

The social network is being used widely by American hepatologists as a medium for interaction and dissemination of medical knowledge. Notable in Europe, where usage is less

active, is Spain, and the activity and interactions of Spanish hepatologists.

But Twitter is not just a forum. It is also a display window. Authors and readers share interesting articles, monographs and data that go viral within minutes and reach a much wider audience than they might have through any conference or journal. In fact, there is already evidence that promotion of articles on Twitter is associated with a citation rate 1.43 times higher than dissemination on the internet.⁵

What the future has in store for us

Are Twitter and #LiverTwitter the new normal in medicine? Yes, definitely, for better or worse. All of the information is there, at the press of a “like”, but also all the misinformation, the difficulty of summing something up in 280 characters and, in some cases, the lack of corroboration, too.

Nevertheless, it is possible to control the network before it controls us. To do so, we must learn virtual auscultation and palpation techniques, we must learn to distinguish opinions from evidence and know how to leverage the plethora of necessary applications at our disposal to separate the wheat from the chaff.

Perhaps we will see fewer and fewer in-person conferences and courses and more webinars and remote conferences. Or perhaps not. In the end, medicine is humanity, and we physicians need human contact and to know that others are dealing with the same problems as us when faced with one disease or another, and that we are not walking that path alone. Could a virtual platform definitively replace the sort of interactions in which we have been engaging for decades? Undoubtedly, some of us are eager to find out. Most likely, the two models will coexist, each with its own advantages and disadvantages. In many cases, they will even be simultaneous with, for example, impassioned live online discussions about a controversial presentation in the auditorium of an in-person conference.

Twitter also represents an opportunity in the relationship between healthcare professionals and scientific associations, on the one hand, and patients, on the other, to promote healthy habits, contribute to a better understanding of diseases and correct inaccurate information. However, it also carries risks inherent to exposure on social networks and some ethical and legal limitations, such as those relating to personal data protection. In spite of this, higher levels of interaction with virtual communities of patients formed around a specific hashtag can be anticipated in the near future.

Conclusions

We are living in an era of paradigm shifts in the dissemination of knowledge spurred on by the emergence and rapid growth of social networks. These shifts centre not on the generation of scientific evidence, but on how it is transmitted and how it is shared from our personal computers, tablets and mobile phones. Within a few years, we have gone from undervaluing the usefulness — and the power — of social networks to using Twitter on a large scale. This previously gradual change in the health sciences underwent exponential acceleration due to the SARS-CoV-2 pandemic.

Twitter is proving to be a very powerful tool in terms of knowledge dissemination and networking. It offers multiple options that may be adapted to our concerns — journal clubs that discuss a specific article, tweetorials that review a topic in depth, and conversations about a specific area marked with a #hashtag. It also offers opportunities to interact live or review content later on. All this information can be accessed in multiple ways — either as *passive users*, with a Twitter usage that is focused on observing and stay-

ing informed, or as *active users*, with different degrees of involvement, sharing and creating content.

In summary, Twitter has become a key tool for knowledge dissemination in hepatology by connecting people, identifying questions, sharing solutions, acting as a hotbed for new research projects, and more. All this is already a measurable reality that continues to grow and evolve and enables us to be more and better informed of the advances made in hepatology.

Conflicts of interest

The authors have no conflicts of interest in relation to this manuscript.

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